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ABSTRACT

The first interactive (on-line) computerized use of the ERIC files by the U.S. Office of Education is reported in the form of an evaluation of the DIALOG system conducted at the ERIC Clearinghouse for Educational Media and Technology. Descriptions of the purposes of the study, of the DIALOG system (developed by Lockheed Missiles and Space Co.), and of the procedures involved in conducting a search of the ERIC file using DIALOG are followed by information on the nine people, from various areas of education, who were asked to help evaluate the system. The major portion of the report, consisting of nine case studies, is based on the reactions of these evaluators (gathered in debriefing interviews) to one or more DIALOG searches which they themselves conducted. In addition, 19 evaluations (based on questionnaires from other system users) are presented. These, along with the nine original evaluations, stress the speed and "horizon-widening" effect of the system. A final section examines the variety of uses for the system at the Clearinghouse. The pre-DIALOG questions, the debriefing outline, and records of the evaluators' searches are appended. (SP/MT)

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AN INTERACTIVE INFORMATION RETRIEVAL SYSTEM-- CASE STUDIES ON THE USE OF *DIALOG* TO SEARCH THE *ERIC* DOCUMENT FILE

By Michele Timbie and Don Coombs

The ERIC Clearinghouse on Educational Media and Technology

Institute for Communication Research
Stanford, California

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" . . . to have right there at your fingertips all the volumes of Research in Education, rather than having first to find the right volume and then the right number--just the physical juggling of those cumbersome volumes is obviated by this, so you can work a lot faster."

——Professor involved in educational research, upon first using the on-line retrieval system.

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I. SUMMARY

The ERIC Clearinghouse on Educational Media and Technology was asked by the U.S. Office of Education to help evaluate on-line computer searching of the ERIC document file. A terminal with its supporting equipment was installed in the clearinghouse, and arrangements were made for data-phone linkage with Lockheed's nearby Information Sciences facilities, where the DIALOG system was available.

DIALOG was to be used to accomplish clearinghouse tasks--both those usually performed and those impossible without such a system--and to see if individuals could sit down at a terminal and, with little preliminary instruction, use such a system to locate relevant educational research documents. The system was employed in a variety of clearinghouse projects and proved extremely useful, but the focus of this report is on nine case studies. These reveal in some detail the reactions of the individuals--who had quite different backgrounds and sought quite different information--to two-hour hands-on sessions at the terminal.

The case studies demonstrate that individuals with no preliminary experience with computers or mechanized information systems can indeed, in a reasonably short time, use a system such as DIALOG effectively.

The two aspects of the system which most impressed the nine evaluators were its speed and the way it "widened horizons"--the way it suggested other relevant areas of information or different approaches to the information originally sought. Verbatim comments from the nine evaluators are presented throughout the report.

When the evaluators were specifically asked to list good features of the system, its speed and its "horizon-widening" effect were mentioned. The way that sets of documents could be combined, using Boolean logic, and the fact that the system was simple to use also were cited.

The evaluators were specifically asked to list bad features, and delays in waiting for the system to execute a command were singled out, along with the feeling that considerable experience or time was needed to master the operating rules. (While some evaluators made this last comment, different ones called the system simple to use and easy to work with.) Users were asked to comment on each component of the system, such as the typed terminal record and the cathode ray tube display. The terminal record was appreciated as a means of monitoring the ongoing search, and as a way of obtaining a permanent record of search strategy. The cathode ray tube was cited as saving great amounts of time and being a natural way to present data. There was criticism of some components, or of their integration in the system. A number of users wished commands could be entered without having to hit so many keys. One section of the report lists changes which have been made in DIALOG since the evaluation sessions; some of the unfavorable comments are obviated by the changes.

Generally favorable reactions to the system from clearinghouse personnel are reported in the last section of the report, written by the project coordinator who spent more than 120 hours at the terminal herself. Concern is registered over problems with both hardware and software, which caused interruptions in scheduled service from time to time. Many of these problems were the natural result of Lockheed continuing to develop the system while it was in use.

To assist in explaining the DIALOG system, a set of 27 slides was prepared to demonstrate a fairly involved search for ethnic studies materials. A copy of the script for the slide presentation is available free from the clearinghouse, and a set of the slides can be purchased from the Information Research Projects Fund (Attn. C. Collins, ERIC at Stanford) for $10.

Finally, the cooperation, assistance and good will of the Lockheed Information Sciences Group--and especially Roger Summit and Don Schaaf--are acknowledged with appreciation, as is the aid and counsel of James J. Prevel of the U.S. Office of Education.

II. INTRODUCTION

A. Why the Study Was Conducted

Because of staffmembers' interest in information retrieval techniques and because of its proximity to the Lockheed Information Sciences Laboratory, the ERIC Clearinghouse at Stanford University was asked to help evaluate on-line, interactive searching of the 12,300 document ERIC file. The Lockheed DIALOG system was considered particularly suited to the analysis of user performance and satisfaction because it turns out a printed record of each step in search procedures. Because DIALOG was developed and was being maintained so close to the Stanford campus, it was relatively simple to make it available in the clearinghouse. A two-piece remote access terminal (printer unit and keyboard/cathode ray tube display unit) had to be installed, along with interfacing equipment, but line charges for connection with the Lockheed computer were relatively low because of the short distance involved. Other steps included obtaining the ERIC file on magnetic tape and converting it for data cell access.

Initial plans were to devote 75% of the six-hours-per-week system time to regular clearinghouse use, and to invite a variety of users to pursue their educational interests during the other 25% of the time. Over the months the actual split of time came close to the planned division, but a good many more people were exposed to DIALOG than that suggests: Regular clearinghouse activity includes answering user requests for a variety of information, and this form of user service was greatly facilitated by having DIALOG available. DIALOG-produced print-outs were

mailed in response to a number of search requests, and many users visited the clearinghouse to observe their searches and make modifying suggestions while they were in process. This kind of DIALOG utilization was separate and distinct from the two-hour, hands-on evaluating sessions which were the basis for the nine case studies. In addition to allowing investigation of the potential of on-line retrieval systems, having the terminal installed at the Stanford clearinghouse brought the Office of Education's interest in employing new technology to the attention of influential people.

The title of this report was chosen to emphasize that the project was not designed as an experiment, in the sense of attributing specific effects to specific causes. Of necessity we are reporting case studies. One of the attractive features of DIALOG is that the strategy employed in each search is permanently recorded, along with the responses of the system. But even this did not allow objective investigation of what search strategies different individuals would favor.

Two hours is enough time for the average user to become quite capable of using the DIALOG system, as this report will show. Two hours is not long enough, however, for a user to gain thorough familiarity with all the different avenues of inquiry possible with the system. (This is not a criticism of DIALOG: with two minutes of instruction the average driver could use a Formula Two racing car to go to the corner grocery, though a skilled driver could benefit from months of experience before going on the circuit with it. It is an admirable design precisely because it can be used under such different circumstances and at different levels of complexity.) But because it takes longer than two hours to acquire a

complete familiarity with DIALOG, the search strategy which each user employed was almost of necessity the one he was first shown.

To determine the search strategies reinforced by DIALOG or those favored when all are familiar to users, it would be necessary to make the system available to the same group of people over a long period of time. Though the sample size is extremely limited (n = 1), some evidence on long exposure to the system was collected. One of the authors of this report scheduled all utilization of DIALOG, introduced users to it, and used it herself approximately 120 hours. Her reflections on these experiences are presented as section 5 of this report.

All of the nine evaluators were busy people, and most would not have participated in the study without the incentive of being able to pursue personally desired information. This precluded any simple experimental design in which different people would be directed to search for the same information. The most flagrant weakness in role-playing thus was avoided, and the satisfaction with the system felt by most users was satisfaction with obtaining meaningful personal assistance.

This approach was felt to be in perfect accord with the point of view which had been expressed by James J. Prevel, Acting Chief of the Bureau of Research's Equipment Development Branch:

> The user of the information retrieval system is the ultimate judge of which information provided him is relevant to questions that he wishes to have answered, REGARDLESS of how he has verbalized these to the system. Only the user's paradigms are to be served by a system rather than some consensus by others who may feel they know what is really wanted by the user, or who claim to know what he should want. In order to measure the effectiveness of an information retrieval system in providing

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> relevant information to users, the questions posed to the system must be derived from the real needs of users who are thus motivated in some real way to have valid responses.
>
> In the final analysis . . . , the question to be answered is not "Is the system operating efficiently?" but "Is the system worthwhile?"

We did give visitors the opportunity to pursue information of vital interest to themselves, but it would be foolish to pretend that there was not any role playing; each visitor was playing the role of "invited guest at the clearinghouse" as well as the role of "individual being confronted with new example of technology." (To put this another way, there was lots of Hawthorne effect.) The extensive interview after the DIALOG session would, it was hoped, get beyond the role playing, to discover more than whether the user was prejudiced toward or against computers or the ERIC system.

B. A Description of the DIALOG System

> *Those readers familiar with the system may wish to skip this section of the report as well as the next, which presents a sample search of the ERIC document file.*

The description of DIALOG presented here is taken, with his permission, from a paper previously prepared by the developer of the system, Roger K. Summit.

> A recent breakthrough in information retrieval has been the use of an on-line computer to assist an individual in identifying which documents in a large collection pertain to a particular

interest topic. By eliminating intermediaries and placing the user in direct communication with the computer, results are available in seconds or minutes instead of days or weeks, and interesting avenues of exploration suggested by preliminary results can be pursued without time lapse . . . .

Not long ago information retrieval was a well-understood process. One simply went to the library, examined the card catalog for an appropriate subject heading, and browsed through the catalog card entries under that subject heading. The numbers of the interesting items were copied down and the documents located and examined. When the collection becomes large and diverse, however, much of the individual's time is spent in data processing; i.e., sorting through catalog cards to identify those of interest.

The advent of the computer led to the proposal of several automatic searching techniques, most of which interposed a systems expert or interpreter between the searcher and the store of information. It then became necessary for the prospective user to describe his interest to the systems expert who interpreted the request and translated it into computer-legible form. To gain efficiency, several such search requests were "batched," keypunched, and fed into the computer. The results were then separated by request, and reviewed by the systems expert before they were returned to the user. It was frequently necessary to input several queries for the same search topic to assure coverage of the collection. Because of the physical distance between the user and the computer, results were delayed; because of the communication distance, results were frequently low fidelity in terms of relevance.

The present generation of on-line computers, which allow the searcher to be in direct contact with the computer, suggest the possibility of regaining the search flexibility of the manual

system in terms of user-corpus proximity, while at the same time providing the user the data processing power of a computer. With this broad objective, design of the DIALOG system was begun. Completed at the end of 1966, the DIALOG language was implemented on an IBM 360/30 computer [and later on a 360/40].

. . . . The significance of a computer-oriented coordinate search system is that it allows items to be indexed with very specific index terms (as opposed to broad subject headings), and allows the user effectively to build his own personalized subject heading at search time by specifying desired and, or, and not relationships between index terms. The final search expression for the topic "welding defects in aluminum" could have been:

"welding" or "arc welding" not
"pressure welding"
and
"defect" or "flaw" or "porosity"
and
"aluminum" or "aluminum alloy"

In this expression there are three concepts, each of which is expressed by multiple terms.

In any coordinate search there are four phases:

Identifying and selecting index terms

Combining or relating index terms by and, or, and not to define a search expression

Generating a subfile of items which meet the criteria of the search expression

Examination of results and modification of search expression

DIALOG commands provide the user a language with which he can direct the computer to assist him in accomplishing these four phases.

Fig. 1--The Terminal, with CRT Display at Right, Printer at Left

EXPAND-IT/CURRICULUM GUIDES

REF	DESCRIPTOR	CITATIONS	REL. TERMS	REF
E1	IT/CURRICULUM DESIGN	32	5	E1
E2	IT/CURRICULUM DEVELOPMENT	618	21	E2
E3	IT/CURRICULUM ENRICHMENT	58	3	E3
E4	IT/CURRICULUM EVALUATION	121	6	E4
E5	*IT/CURRICULUM GUIDES	415	14	E5
E6	IT/CURRICULUM PLANNING	175	9	E6
E7	IT/CURRICULUM PROBLEMS	24	4	E7
E8	IT/CURRICULUM RESEARCH	122	8	E8
E9	IT/CURRICULUM RESTRUCTURING PROJECT	1		E9

ENTER NEXT COMMAND▶

Fig. 2--The CRT Display Screen, after an "Expand" Command

With the DIALOG retrieval language, the user can browse through thousands of citations in seconds. This is accomplished by storing the citations in a remotely located computer, and providing the user an input/output terminal connected to the computer over a telephone line. By issuing commands to the computer, the user causes the computer to process its store of information in much the same basic manner as does the person conducting a manual search on a traditional library card catalog.

The input/output terminal consists of a keyboard/display device (on the right in Fig.1) and console-printer (on the left). The keyboard of the display device is used to communicate commands to the computer, whereas the display screen and the console-printer are used by the computer to return requested information to the user. As information is typed in on the display keyboard, it appears on the screen, and errors can be corrected by backspacing and overtyping.

[The DIALOG commands] are actually labels associated with the top row of keys on the display keyboard, and are issued to the computer by merely depressing the appropriate key. [Use of these commands is illustrated in the next section of this report with an actual search.] . . . .

The DIALOG language offers a powerful, user-directed retrieval language which:

> Provides the user a variety of "command" functions for communication, search, and display of information
>
> Provides flexibility to include additional commands or other operational modes as new search techniques are developed
>
> Assists the user in search definition and in full employment of system capabilities
>
> Allows intermediate user evaluation of search results with subsequent request refinement or modification
>
> Accepts any arbitrarily complex or detailed search descriptions

Operates effectively with existing information stores without requiring the re-indexing of the stores

Requires a minimum of bookkeeping or remembering on the part of the user

Minimizes elapsed time between query and response

Eliminates need for "middle-man" request interpretation by system specialists

Allows real-time interaction between user and system for search guidance

Is easily learned by nonspecialists

——By Dr. Roger K. Summit
Information Sciences Laboratory
Lockheed Missiles and Space Co.
Palo Alto, California

C. How Would a DIALOG Search Proceed?

The commands which allow the searcher to manipulate the ERIC file on the computer are quite simple. Each of the special characters on the keyboard above the numerals (such as @ and %) stands for one command or one type of manipulation. The four principal commands used in searching are the EXPAND, SELECT, COMBINE, and DISPLAY.

Briefly, the EXPAND command can be used to show the searcher two kinds of things. First it brings onto the screen a "window" or a "page" of the alphabetical index where a particular term is located, giving the number of citations posted to the terms as well as the number of cross-referenced thesaurus terms listed for each (see Fig. 2). Each visible entry is marked with a reference number plus the letter "E" (E1, E8, etc.). Secondly the EXPAND command brings the cross-referenced entries for a particular term

E-IT/CURRICULUM GUI			
S-E5	1	415	IT/CURRICULUM GUIDES
S-E2	2	618	IT/CURRICULUM DEVELOPMENT
E-IT/INSTRUCTIONA			
S-E5	3	998	IT/INSTRUCTIONAL MATERIALS
S-E4	4	2	IT/INSTRUCTIONAL MATERIAL
E-E5			
S-E12	5	1	IT/EDUCATIONAL MATERIALS
E-IT/AUDIOVISUAL AI			
S-E5	6	365	IT/AUDIOVISUAL AIDS

Fig. 3--A Sample of the Typed Terminal Record

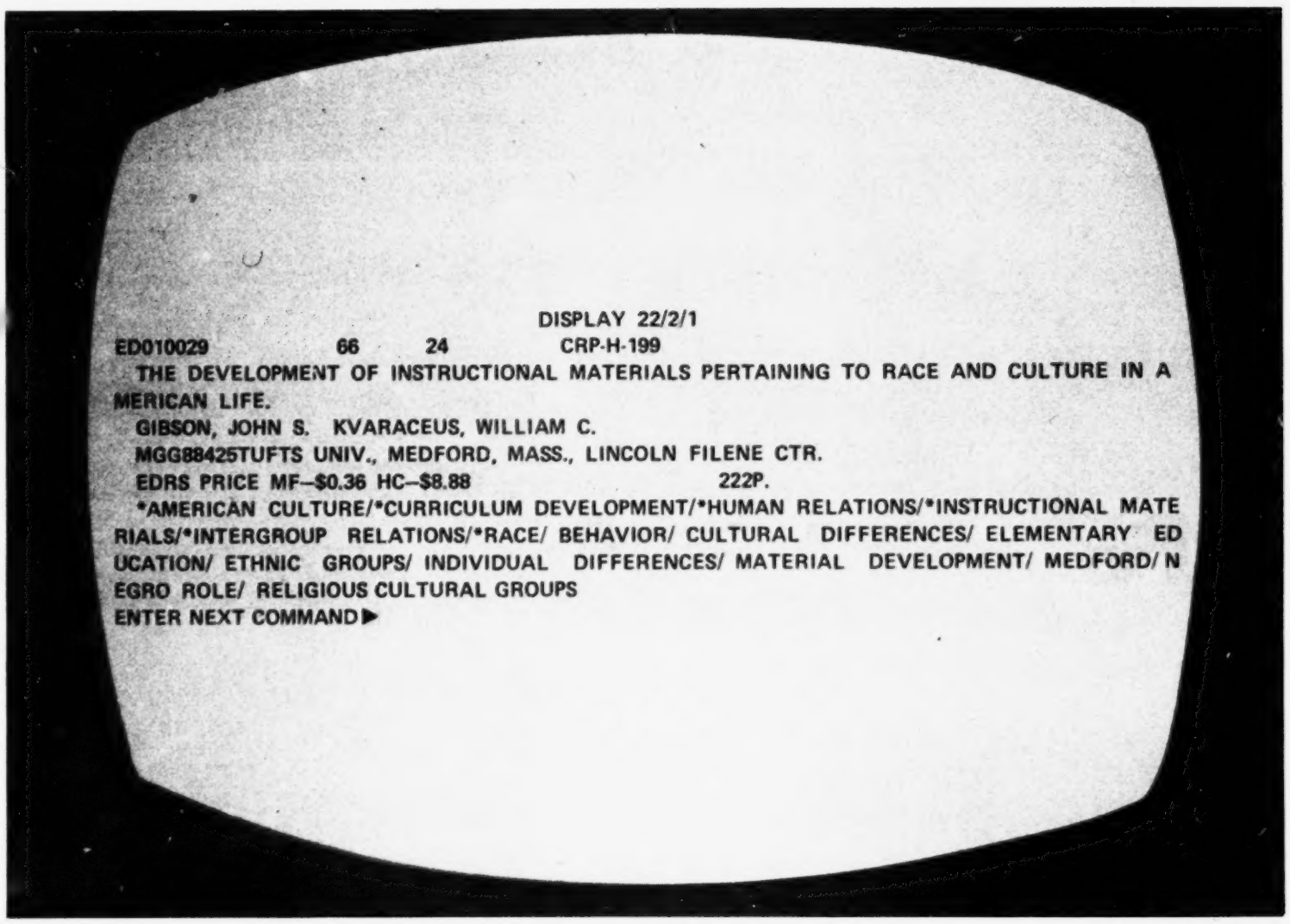
DISPLAY 22/2/1
ED010029 66 24 CRP-H-199
THE DEVELOPMENT OF INSTRUCTIONAL MATERIALS PERTAINING TO RACE AND CULTURE IN A MERICAN LIFE.
GIBSON, JOHN S. KVARACEUS, WILLIAM C.
MGG88425TUFTS UNIV., MEDFORD, MASS., LINCOLN FILENE CTR.
EDRS PRICE MF--$0.36 HC--$8.88 222P.
*AMERICAN CULTURE/*CURRICULUM DEVELOPMENT/*HUMAN RELATIONS/*INSTRUCTIONAL MATE RIALS/*INTERGROUP RELATIONS/*RACE/ BEHAVIOR/ CULTURAL DIFFERENCES/ ELEMENTARY ED UCATION/ ETHNIC GROUPS/ INDIVIDUAL DIFFERENCES/ MATERIAL DEVELOPMENT/ MEDFORD/ N EGRO ROLE/ RELIGIOUS CULTURAL GROUPS
ENTER NEXT COMMAND▶

Fig. 4--The CRT Display Screen Presenting a Citation

onto the screen, again showing the number of posted citations and the number of thesaurus entries for each one. In order to identify which index the term could be found in (author, title, descriptor, etc.) the searcher prefixes his term with a two-letter abbreviation identifying the index. (For example, IT/ is the prefix for the subject or descriptor categories.)

The SELECT command allows the searcher to set aside for future use any terms--and therefore the documents indexed by them--which he wants to incorporate in his search. The typed terminal record, which is produced on the printer that is part of the terminal, records each command and indicates the identification or set number which is assigned to each group of documents as it is set aside (see Fig. 3).

After selecting out every term in the file which relates to each concept in his search, the searcher then COMBINES the terms appropriate to each concept by adding (in Boolean logic, ORing) the terms together to create a new set. When the selected terms have been grouped according to concept, the concept sets are then COMBINED again, this time so that the sets intersect (in Boolean logic, the terms are ANDed). This second combination narrows in on the few documents which are indexed by at least one term from *each* of the concept sets.

The resumes for the new, narrowed set of documents can then be brought to the screen one by one, using the DISPLAY command (see Fig. 4). The searcher may now go through what he has retrieved, selecting those documents which he will wish to examine further in hard copy or microfiche form. Finally, the results can be printed off-line using PRINT (this is quite fast), or they can be typed, using the TYPE command, on the terminal

printer (this is much slower). The format for this printout is also at the option of the searcher.

In the latter part of this section of the report, the search of one of the evaluators has been annotated with a running commentary on the operations and strategy. The appendix contains the search records of the other eight evaluators, one of which is also annotated.

As an introduction to the following search record, it should be said that the evaluator wished to obtain information on flexible scheduling.

SEARCH TITLE: FLEXIBLE SCHEDULING
DATE: 07/23/69
REQUESTOR: PERSON H - 2

The 4 column headings indicate what command was given, what set number was assigned (if a set was created), how many documents are contained in that set, and finally a description of its contents.

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)	
E-IT/FLEXIBLE SCHED				*The alphabetical index around the descriptor, FLEXIBLE SCHEDULING, was expanded (E).*
S-E4	1	11	IT/FLEXIBLE SCHEDULE	*There were 11 documents on FLEXIBLE SCHEDULE which were selected (S) to form set 1, and 21 documents on FLEXIBLE SCHEDULING which were selected to form set 3. Set 2 contains a document on the FLINT YOUTH STUDY which also appeared in the alphabetical display and was of interest to the evaluator.*
S-E8	2	1	IT/FLINT YOUTH STUDY	
S-E5	3	21	IT/FLEXIBLE SCHEDULING	
E-E5				*FLEXIBLE SCHEDULING was then expanded by its reference number, E-5, in order to display its thesaurus entries.*
S-E18	4	80	IT/TEAM TEACHING	*This located 7 more terms which the evaluator considered relevant to the concept of scheduling. These were selected in turn by their reference numbers, producing sets 4 through 10.*
S-E10	5	56	IT/SCHEDULING	
S-E11	6	50	IT/CLASS SIZE	
S-E12	7	72	IT/COURSE ORGANIZATION	
S-E16	8	11	IT/SCHEDULE MODULES	
S-E17	9	23	IT/SCHOOL SCHEDULES	
S-E19	10	15	IT/TIME BLOCKS	
C-1-10/+	11	301	1+2+3+4+5+6+7+8+9+10	*Set 11 was created by the union or addition of sets 1 through 10. This set then included all terms relating to the concept or idea of creative or differing scheduling methods.*
E-IT/PROGRAMS				*The evaluator now turned to the program aspect or concept in her search, and expanded the index around the term PROGRAMS.*
S-E5	12	50	IT/PROGRAMS	*This was selected to form set 12, and then expanded by its reference number to see the thesaurus entries.*
E-E5				

S-E34	13	68	IT/DEMONSTRATION PROGRAMS	*Eight more relevant terms were located and selected to form sets 13 through 20.*
S-E35	14	33	IT/DEVELOPMENTAL PROGRAMS	
S-E39	15	304	IT/EDUCATIONAL PROGRAMS	
S-E46	16	246	IT/EXPERIMENTAL PROGRAMS	
S-E49	17	26	IT/FOUNDATION PROGRAMS	
S-E55	18	61	IT/INDIVIDUALIZED PROGRAMS	
S-E58	19	87	IT/INSTRUCTIONAL PROGRAMS	
S-E77	20	18	IT/SCHOOL COMMUNITY PROGRAMS	
E-IT/PROJECTS				
S-E5	21	37	IT/PROJECTS	*The term PROJECTS was expanded and selected to form set 21. However, when it was expanded by its reference number, nothing of interest was discovered among the thesaurus terms listed under it.*
E-E5				
C-12-21/+	22	868	12+13+14+15+16+17+18+19+20+21	*The searcher now added together the program terms to form set 22.*
C-11*22	23	39	(1+2+3+4+5+6+7+8+9+10)*(12+13+14+15+16+17+18+19+20+21)	*Sets 11 (the scheduling set) and 22 (the program or project set) were next combined (C) to form an intersection, the AND operation in Boolean logic, with the resulting set 23 containing 39 items indexed by at least one term from each concept set.*
D-23				*The resumes for this set were then displayed (D) on the screen, and the relevant ones set aside using the keep (K) command. When set aside in this manner the items are filed in a reference set which is arbitrarily numbered 99.*
K-23/1				
K-23/3				
K-23/5				
K-23/6				
K-23/7				
K-23/8				
K-23/10				
K-23/12				
K-23/13				
K-23/14				
K-23/16				
K-23/17				
K-23/19				
K-23/21				
K-23/22				
K-23/24				
K-23/25				
K-23/26				
K-23/27-29				

P-99/5 1-21 ITEMS HAVE BEEN PRINTED

Finally, the items put aside in set 99 were printed (P). Format 5 which contains the cataloging, indexing and abstract for each document was chosen. After the print had been completed off-line at Lockheed, the results were sent to the clearinghouse for forwarding to the evaluator.

III. HOW THIS STUDY WAS CONDUCTED

An attempt was made to get people in a variety of professional roles to sit down at the remote access terminal for two-hour sessions. The nine evaluators are described below, with identifying letters which are used all the way through this report to indicate which search records and which verbatim answers are from which user.

	Professional Description, Age and Sex	Information Sought, in the Visitor's Own Words
Person A	Researcher engaged in the planning, technical aspects and conduct of educational research projects (28, M).	Adult basic education programs for the disadvantaged unemployed, especially as pertains to industrial programs.
Person B	Motivational educator in private practice, working with children referred by schools, doctors, etc. (41, F).	Instructional innovation, multi-media instruction and research design.
Person C	Graduate student in education who will return to district to work (25, M).	Information relating to multi-media techniques involving instructional television, multi-level reading materials, simulation games, role playing, and 8mm film loops. Also materials on conservation projects in film and television and attitude evaluation techniques for elementary school students.
Person D	M.D. engaged in psychiatric research and therapy (29, M).	Studies of the perceived environment of educational settings.
Person E	Assistant Professor of Linguistics and Computer Science (27, M).	1) Computer science articles for Univ. of San Francisco Computer Dept. information retrieval. 2) Linguistics, more specifically, computational linguistics (my field).

Person F	University librarian directing library automation, and involved in developing a different on-line retrieval system (40, M).	Library automation, data management, file organization, library technical processing, micropublication (plus many subjects with prefix "micro-"), computer applications to text processing, visual displays. Entire general area of communicating bibliographic data from files to users.
Person G	Professor of education teaching and doing research in educational psychology (52, M).	References to theoretical and/or empirical literature on lecturing and similar "presentational" methods of teaching, the determiners of their effectiveness in promoting achievement of various educational objectives.
Person H	Elementary school teacher (24, F).	Individualized programs in education, flexible scheduling, developmental placement.
Person I	Secondary school teacher doing graduate work to assist him in developing media programs at his school (26, M).	8mm single concept films in relation to individualized instruction.

Most of the nine had approached the clearinghouse for assistance in finding educational information without knowing of the DIALOG system. A few (such as the elementary school teacher and the graduate student) were specifically recruited in order to include persons in those positions, but only after prior checking to determine that they had information needs connected with on-going educational projects.

Appointments were made about two weeks in advance of the two-hour sessions, and this made it possible to send most users the DIALOG manual. (Some of the first users could not be supplied manuals as there was a delay in printing at Lockheed. Readers of this report who would like a copy of the manual should request one from the clearinghouse.)

Each user was asked to come about 30 minutes before the time the system became operative, and the "Pre-Dialog Questions" (appended) were administered then. The user's questions about the system were answered, and he was shown the terminal. When the DIALOG programing was loaded at Lockheed and the ERIC document file made accessible on an IBM Data Cell, the visitor sat down at the console and performed all searching himself. Mrs. Timbie remained throughout the session, coaching the user and prompting him to make use of different aspects of the system until he had some familiarity with it.

After the session was over, and after a brief coffee break, Mrs. Timbie followed the "Dialog Debriefing Outline" (appended) in interviewing the visitor about his experience. The entire interview was tape recorded and, later, converted to a typed transcript. These transcripts were coded to produce some relatively objective summary results, and the transcripts also provided the verbatim answers presented in this report.

(Verbatims sometimes are used to "flavor" a report; in this one they play a more important role--they give a good idea of the evaluators' reactions to an interactive system.)

Reliability of only 77% was achieved on coding the combined questionnaires and interview transcripts, but this was considered satisfactory under the circumstances: No training program was carried on for coders, and most disagreements were the result of two misunderstandings--

1. In coding the number of good and bad comments about DIALOG, one coder included comments about the general ERIC system.

2. The other coder counted every good or bad comment, even though essentially the same comment had been made earlier in the interview by the same person.

All nine questionnaires and interview transcripts were coded by each investigator, and then the coding was reconciled by both investigators referring again to the questionnaires and transcripts.

Some questions on the debriefing outline pertained to the visitor's experience with other aspects of the ERIC system. These questions were asked last so they could not influence any other questions, and the answers--though of interest to ERIC personnel--are not included in this report because they have no direct relation to DIALOG.

Each of the nine visitors was asked for information on his previous experience with mechanized retrieval systems, so that the relationship between that and the evaluation of DIALOG could be investigated. That particular investigation was abortive; almost all the visitors were enthusiastic about the system, and almost all had no previous experience with mechanized retrieval systems. (Only two visitors had done more than "hear about" on-line retrieval systems. One had read about them, and the other was involved in designing such a system.)

One conclusion justified by this information is that the evaluators were representative of the majority of educators who would be served by any future move to make the ERIC file available to mechanized search. Certainly they were not hand-picked because of considerable experience with and interest in computers and information retrieval.

IV. RESULTS OF THE NINE CASE STUDIES

A. General User Evaluation of the System

One big question to be answered was whether individuals with no previous experience with interactive information systems could sit down at a terminal and, in a reasonably short time, use such a system effectively. The answer was an unqualified yes.

For the most part, evaluators were enthusiastic about their two-hour experiences. Before they were asked to comment on specific aspects of the system, which was a form of prompting, the visitors were encouraged to put on record whatever impressions they wished to report. All of these "unprompted" statements are included in this section of the report, in their entireties, in order to give a fair picture of user response.

The two aspects of the system which were most frequently commented on were 1) its speed, and 2) the way it "widened horizons," the way it suggested other relevant areas of information or different approaches to the information originally sought.

Following are unprompted statements bearing on speed, identified by which evaluator was speaking:

> " . . . It's just a fantastic savings of time." (A)
>
> "It would have taken me many months of research to have come up with such extensive, comprehensive references." (B)
>
> "I'm impressed by the speed . . . ." (C)
>
> "It very clearly saved me a great deal of time." (D)

" . . . Much easier access to information . . . . I would never go to the library and search out any of that . . . . It creates an interest, for me." (H)

"A great saving in time." (I)

Following are unprompted statements about the "horizon-widening":

" . . . Opened up new avenues for thought." (B)

" . . . Expanding areas that I hadn't considered as being related to the subject." (C)

"It had a sort of fallout of new ideas and possibilities." (D)

"I was amazed at . . . what possibilities it offered for further learning." (H)

Much of this report attempts some quantification of evaluators' responses. At this point, the verbatim transcripts of all general remarks are presented because of the feel they give about the sessions. The responses to the two first questions (Did you find relevant information? What are your general comments?) are merged here:

Person A (Researcher engaged in the planning, technical aspects and conduct of educational research, 28, M.)

"Did you locate relevant information?"

Very definitely. Of the ones that I've seen, and we saw about 30 articles, with the 80-90% that I retained, I would have to say that I found relevant articles . . . . The system itself, as you go through it, you're expanding terms and you come across terms that invite a little bit of thinking in other directions so it gives you the opportunity to keep expanding your own ideas of what your search involves, as you actually go through it. So I think that's fruitful, too . . . . I think it's very useful,

just being able to spend approximately two or three hours, to go through that thorough a search, has got to be very much to any researcher's advantage. . . . . I think that the system in general, the way that it's organized now, is highly effective. I can't think of anything that I'd criticize. In terms of the procedure that is available to actually see articles, to go from seeing the subject-titles and the authors, etc., to the abstract and these types of things, so you can actually . . . go into detail or you can leave it alone, all the different combinations that you can do with your search--it's just a fantastic savings of time.

Person B (Motivational educator in private practice, working with children referred by schools, doctors, etc., 41, F.)

"Did you locate relevant information?"

Very crucial [information]. And I think, probably, it would have taken me many many many months of research to have come up with such extensive, comprehensive references . . . . I think what it has done, too, it has opened up new avenues for thought. And, you know, creativity. I really do . . . . It has great potential for releasing some of our rather inhibited mechanisms, you know, in terms of our own ways of thinking. I think that somehow, we have been confined to a very very limited way of conceiving data. And I think what this is going to do is explode all of our patterns of thinking, and I think it's going to remove a lot of barriers and bring us, probably, into a new level of communication and education and exploration. I just think it has great possibilities for growth . . . . Just say it has infinite possibilities.

Person C (Graduate student in education who will return to district to work, 25, M.)

"Did you locate relevant information?"

Yes, I'd say, based on the abstracts that we looked at, and on the descriptions of those materials, that I have . . . . Yes, the answer is yes. In one sense, the fact that there just aren't very many materials in some of those areas--it's good to find that out too . . . . I'm impressed by the speed at which you can retrieve information and particularly by the way in which you can combine sets of information. And then retrieve from these sets the relevant factors and the combinations of relevant factors. That seems like a very powerful tool to me . . . . I found a couple of times that in searching broad areas that we ran across information that I wasn't aware of, and titles and subtitles of things I wasn't aware of. I think this was very helpful too, by expanding areas that I hadn't considered as being related to the subject.

Person D (M.D. engaged in psychiatric research and therapy, 29, M.)

"Did you locate relevant information?"

Not in the exhaustive sense of bibliographical research. But it had something else--it gave me some ideas of new techniques that I hadn't seen before or sort of headings to look under that I hadn't thought of before. So, in the sort of exhaustive sense, again, I think it's probably as useful as giving further references. But it had a sort of fallout of new ideas and possibilities . . . . It very clearly saved me a great deal of time. And a great deal of energy . . . . [But] it's hard on the eyes after a couple of hours.

Person E (Assistant Professor of Linguistics and Computer Science, 27, M.)

"Did you locate relevant information?"

It's difficult to say, but my guess would be yes. In the areas of computers, yes. I realize that the ERIC file is specific to computers as they are used in education, not specifically research in computer science. But, as far as the file goes, yes, I would say in computers. As far as linguistics is concerned, partially, I hoped I would get a chance, you know, to look at some more of the information there . . . . I like the Boolean logic in there, as it's very useful. I would say that--first let me tell you the things that I like about it, and then I'll tell you the things that at least right now appear to be difficult. I like the rather direct sequence in which you can go from the thesaurus to the actual document, with only three keys. I believe it's the EXPAND, SELECT and DISPLAY. The fact that you have to do a minimum of typing, that's a very good feature--that you use the keys, like EXPAND, rather than type out something. The NOT part of the Boolean logic, I wasn't able to see a reason for. Now to get into the critical aspects of it. Having to look from the console to the teletype for set number was an inconvenience, but I suppose that one could get used to that, if he were to use the system more often . . . . Aside from that, I was very pleased with the system. I think I got what I was looking for . . . .

Person F (University librarian directing library automation, and involved in developing a different on-line retrieval system, 40, M.)

I'd say, in general, I found it somewhat cumbersome to use. I think the fact that you must set aside index terms, authors, or what have you, separately to a set on an auxiliary device, and

then do the combining as an afterstep, is kind of unhandy. I think my preference would be to construct a search the way I want it, eventually, to be . . . . I think that if the response from the cathode ray tube and the whole system in general were a lot faster than it was, I perhaps wouldn't feel constrained by that limitation . . . . I'm inclined to think a printed thesaurus, that the user can have immediate access to so he could familiarize himself with the terms of interest, would be far more efficient for the user. I think after a week or two of use, if a man used this daily, even if for as little as an hour a day, he would learn his vocabulary, or relearn it, and thus become relatively independent of the printed vocabulary. Having to use the system, to learn the vocabulary [the descriptors from the thesaurus?] I think is extremely inefficient. And very time consuming . . . . One real great feature of this system is the fact that you do have the sets retained on the print-out. If you want to go back to them later, you've got kind of a backup feature. Your results are saved. I think that's a great advantage, but it's an advantage that occurs after you've been at it for awhile--suddenly you realize that you want to go back. When you're first starting out, it looks like a disadvantage.

Person G (Professor of education teaching and doing research in educational psychology, 52, M.)

"Did you locate relevant material?"

Oh, I'm sure I have, just that one item that I have copied the reference for looked very exciting, and one I have never heard of before, but beyond that, whether I really got any gold is still a question in my mind . . . . I think that the system was working along the lines that I wanted it to work, insofar as the content--the research and the abstracts that are in ERIC--are relevant.

Person H (Elementary school teacher, 24, F.)

"Did you locate relevant material?"

Yes, definitely . . . . Of the two that we researched, I thought that they were covered, particularly reading . . . . I think it takes more familiarization than what I have. I mean, I don't feel I could go in and use it effectively right now, even after spending two hours with you, although I think that once you could use it efficiently, then it would be really worthwhile. I mean, I was amazed at how much information there was, and what possibilities it offered for further learning . . . . I think, because of this efficiency, if it could be easily available to a lot of people--once you've learned to use it simply, which I think possibly is a problem--well, you'd have much easier access to inform[illegible]on . . . . I would never go to the library and search out any of that, I would never even begin to do any of that, because of the simple system like that, you would be more encouraged to find out more about your field. I would . . . . It creates an interest, for me. It created an interest in looking up things in my field, which I wouldn't normally do, simply because the [regular] process of having to look it up is more difficult than I want to spend the time to do.

Person I (Secondary school teacher doing graduate work to assist him in developing media programs at his school, 26, M.)

"Did you locate relevant material?"

Yes, I did . . . . I think the system can be very helpful to anyone doing research and, particularly, you may narrow this down to, you can find out if there is information available in the subject you're researching. This is what I think is a great saving in time. One of the greatest helps, I think, is the great saving in time. You can devote more time to the research and the

study when you have the information that you need . . . . It's simple to use, I think, particularly after it's explained. After you explained it to me, I felt it was very easy to use, and very easy to understand.

B. Good Features of the System Singled Out

After each of the nine evaluators had commented generally on DIALOG, he was asked to specify the good aspects of the system (as can be seen in the appended "Debriefing Outline"). Combining the "general comments" and "specific good aspects" statements, there were a total of 44 good points singled out. (This is a little like compiling batting averages in Little League, but the total score would be 44 good points, 28 bad points listed. Precisely which aspects of the system were considered good and which bad will be reported in this and the next section of the report.)

Of somewhat greater value than the 44/28 breakdown is the finding that there were 25 different good aspects reported, 18 different bad aspects. But there are problems even there; should comprehensiveness, effectiveness, and being of general value be considered three different favorable aspects? We decided to report them separately, because the reader then may want to mentally combine them in a general "effectiveness" category, whereas if they were reported in combined fashion the reader never could separate them out. The chosen approach has the virtue of leaving errors out in the open.

Six of the evaluators noted the speed of the system and its saving of user time. The next most frequent favorable observations were that being

able to combine sets was very desirable (volunteered by 5 evaluators) and that using the system had opened new avenues for thought, or "widened horizons" (volunteered by 4 evaluators). Three of the evaluators commended the system for being simple to use, easy to work with.

Five different favorable comments were made by two evaluators each:

The system is thorough, comprehensive.
The system is effective.
The system is generally valuable.
The system is exhilarating, interest-creating.
Having the hardcopy record to refer to is handy.

The favorable aspects of the system volunteered by single evaluators, along with those already reported, are included in the table below. The letters indicate which evaluator or evaluators made each comment:

Favorable Aspects of the System
Volunteered by Evaluators

User	Statement
ABCDHI	The system has great speed, saves user's time.
CDFGI	Being able to combine sets that way is a desirable feature.
BCDH	The system opens new avenues for thought, it "widened horizons."
CHI	It is simple to use, easy to work with.
AH	It is thorough, comprehensive.
AH	It is effective.
AH	It is, in general, valuable.
BH	It exhilarates, creates interest.
EF	Having the hardcopy record to refer to is handy.
B	The system releases inhibiting mechanisms.
B	It brings us into a new level of communication and education and exploration.
B	It is challenging.
B	It provokes you to order your approach.
C	It presents good descriptions of documents.
C	It presents a variety of topics.
C	There is the attractive possibility of being able to access the system from anywhere in the country.
D	The system saves user energy.
E	The Boolean logic is useful.
E	The direct sequence of going from the thesaurus to the document is nice.
E	There is a minimum amount of typing, because of the presence of the command keys.
E	The particular documents sought were identified.
E	[It is a generally attractive system]--"we'd like to have one."
E	Presented as they are on the CRT, the terms can be scanned quickly.
E	Paging was easy.
F	The expand feature was useful.

C. Bad Features of the System Singled Out

As can be seen in the appended "Debriefing Outline," the evaluators were prompted to identify what they considered bad features, but they were not asked leading questions. The comments presented here are from the combined "general comments" and "specific bad comments" statements.

Delays in waiting for the system to accept and execute a command were singled out as a bad feature by four evaluators, as was the feeling that considerable experience or time was needed to master all the operating rules. Three different critical comments were made by two evaluators each:

> Too many combinations of keys are needed to input one command,
>
> Having to build combined sets one step at a time, rather than using parentheses, and doing it with one complex statement is inconvenient, and
>
> There is a great deal of "paging" required on the CRT, because you can only look at nine terms at a time.

The unfavorable aspects of the system volunteered by single evaluators, along with those already reported, are included in the table below. The letters indicate which evaluator or evaluators made each comment:

Unfavorable Aspects of the System
Volunteered by Evaluators

User	Statement
ABFI	There are delays when you must wait for the system.
FAIC	Considerable experience or time is needed to master the rules.
AI	Too many combinations of keys are needed to input one command.
EF	Having to build combined sets one at a time, rather than doing it with one complex statement, is inconvenient.
EF	There is a great deal of "paging" required on the CRT, because you can only look at nine terms at a time.
B	The innovative system can be frustrating for people who don't like to change.
D	The system is limited because of the original input [a reflection not on DIALOG, but on ERIC].
D	The CRT is hard on the eyes after a couple of hours.
E	Having to look back and forth from the CRT to typewriter unit is inconvenient.
E	Having to repeat pushing the button so much--for every 10 things you want printed--is inconvenient.
E	A hierarchical thesaurus display would be preferable.
E	It must be expensive.
F	It is cumbersome to use.
F	Having to use DIALOG to approach the thesaurus is inefficient [actually, of course, you don't].
F	The letters on the CRT have an unpleasant shape.
F	The CRT display is "painted on" too slowly.
G	There are weaknesses in indexing [this is not a weakness in DIALOG].
I	The hardware fails [some set numbers were not printed out during that particular session].
I	The touch of the keyboard is too different from that of most typewriters.

D. Prompted Evaluation of Components of the System

Each evaluator had unstructured opportunities to specify what he considered bad or good about the system, and these comments formed the basis for parts A, B and C of this section of the report. Then he was specifically asked for comments on the different components. One problem with this approach was that some comments were on the hardware, while others were on the process of its use. Both kinds are presented here.

1. The Terminal Keyboard

Most evaluators found no fault with the keyboard, but four did wish that search and display commands could be entered with less complex key selection.

Unfavorable comments (with letters identifying which evaluator or evaluators made each comment):

ACGI Being able to use one key, rather than shifting for commands, would be desirable.

FI Keyboard doesn't have good touch, seems clumsy.

Favorable comments:

ABCDG Keyboard is easy to use, is a universal type thing [so is easy to get used to].

E Keys are closer than on big IBM 2741--that's one good feature, that you don't have to move around too much.

H Isn't a universal size--is smaller--but doesn't present any problem.

2. Typed Terminal Record

Only two relatively minor criticisms of the typed terminal record were forthcoming. Four evaluators described it as generally useful, four said that it was valuable after the search, as a record.

Unfavorable comments:

A Having to keep turning the knob to get the paper up to separate some of the concepts is undesirable.

D I forgot what some of the letters stood for.

Favorable comments:

BFGI Generally useful.

CEHI Is valuable later on, as a record.

CI Is useful as a self-correcting device, during the search.

DH Is easy to understand.

E Can be used later to explain how a system like this works.

3. The Cathode Ray Tube Display

Most evaluators felt the visual display on the cathode ray tube allowed great savings of time, and was clear and easy to read. Other favorable comments were that it was exciting and that that mode of presentation avoided the clatter of a printer. On the other side of the ledger, some evaluators found awkward features:

Unfavorable comments:

D Gave me bleary eyes after a while.

G Breaking words at the end of the line, with no regard for syllabification, is awkward.

H Sometimes it's hard to line up numbers, to figure out which line a number is on, because they're close together.

H In going through displays, after you hit the KEEP command, and the ENTER command, why couldn't it just naturally progress to display the next one?

I It takes a few minutes to get used to.

Favorable comments:

ACEG It saves lots of time.

CHID It was easy to read, clear.

BH Very clear, very exciting . . . a very natural way of receiving information.

D Very helpful.

D Being able to see the abstract that way was extremely helpful.

E Avoids clatter of a printer.

F For a quantity of data, you must have a visual display . . . . [This was] a nice combination of the two kinds of display.

4. Timing of System Response

Evaluators were specifically asked about this because some clearinghouse personnel came to be critical of delays when it was necessary to wait to input the next command. Only four of the nine evaluators were at all critical of delay; most were so impressed by the performance of the system that any delay was of no consequence. One felt such variation in pacing suggested that he was running the machine, rather than vice-versa. Though the logic of that last remark is tenuous, the general conclusion was evident: At least while learning to use the system, few persons are bothered by having to wait sometimes to enter commands.

Unfavorable comments:

F Delays bothered me in paging.

H It took time to get accustomed to waiting to enter the command to move to the next display.

Favorable comments:

AGI . . . You realize it's inevitable, you've got to have some sort of delay, because you have a tremendous system going to work here . . . .

B No [bother]. I was so busy, thinking about what was happening.

C No [bother] . . . It's just as well that there may be some variation in pacing. [Otherwise] I think I'd get a little nervous about am I running the machine or is the machine running me? So I don't mind the pacing.

E Delays bothered somewhat . . . but the pause is shorter than the WYLBER (another system) pauses are.

5. Having the Thesaurus Available on the System

Prompting the evaluators to comment on the thesaurus produced little criticism. All thought of it as a useful feature.

Unfavorable comments:

F Would possibly be less expensive [to have it available only in hardcopy], or have only the updated terms . . . on the terminal.

Favorable comments:

ABDEFGHI Fine, useful, important, no criticism.

CD Helps you to zero in on things you may have missed.

It seems fair to point out here that the existing ERIC thesaurus was not being compared with other thesauri, or with any might-have-been ERIC

thesaurus. The evaluators were responding to having the thesaurus available for machine searching, rather than depending on the hardcopy version.

6. The Manual

Like the thesaurus, the manual came in for few negative comments from the evaluators. Clearinghouse personnel felt it should have been more oriented to the educational user (as is pointed out in section VI of this report), but only one of the evaluators criticized it. In addition to calling part of the manual confusing, that evaluator made what was considered an excellent suggestion: Computers should not be used as the subject of a sample search, in the manual, when the retrieval system which is being introduced is itself computerized.

Unfavorable comments:

I It started out to be easily understood, got very confusing. I think the last part could be rewritten in clearer terms. And . . . I think it definitely should not be dealing with the subject of computers . . . . This is confusing because you're using a computer.

Favorable comments:

A I didn't find the manual difficult. I thought the instructions quite good.

B It's clear, complete.

DH O.K.

The other four of the evaluators did not comment on the manual, either because printing delay at Lockheed kept the evaluators from being supplied prior to arriving for their appointments or because the question was inadvertantly omitted in their debriefing interviews.

E. Reconsideration of the Unfavorable Comments in View of Later Changes

With the implementation of a new version of the programing, called DIALOG II, on July 29, 1969, certain of the features commented on unfavorably were improved. The following contains selected unfavorable comments and a description of the new features which bear on them. DIALOG II was introduced after the last evaluation session had been conducted, but some data on DIALOG II is discussed in section V of this report.

"Having to build combined sets one step at a time, rather than doing it with one complex statement is inconvenient." Previously, only one type of Boolean operation could be done with one COMBINE command. It will be remembered that there are three operations, OR, AND, NOT. With DIALOG II, through the use of parentheses, the set numbers could be grouped in complex expressions so that more than one operation can be performed at once if desired, i.e., >(1+2+3+4)*(7+12+13+14).

Another new feature made it no longer necessary to SELECT items from an index or thesaurus display one at a time. Ranges of items could be selected with the same command, using the comma and hyphen as punctuation for grouping the terms. For example: <E5-E7,E10,E12 selects out items E5 E6 E7 E10 and E12. The one limiting factor here is that you must want these sets "ORed" in your final product, as only one set is created by the selection of such a range.

"There is a great deal of 'paging' required on the CRT, because you can only look at nine terms at a time." While this criticism was not entirely obviated, the displays of the indexes and the thesaurus entries

were differently arranged to allow more than nine terms to appear at one time. The number was no longer constant; the number that could be seen at one time depended on the length of the terms being displayed. The maximum was 18 terms. Paging was no longer accomplished by pressing the ENTER key; it was a separate command. Finally, it was possible to PAGE i rward in the index display, instead of having to EXPAND a new term in order to see what follows the ninth term on the display. (It was always possible to PAGE forward in the thesaurus display.)

"Having to repeat pushing the button so much--for every 10 things you want printed--is inconvenient." This feature was originally intended as a safety feature to keep someone from accidently triggering a print of a huge set of documents. Since sets of 1,000 or 2,000 documents are frequently created and the entrance of a wrong set number with a PRINT command could be disastrous, this was a good idea. However, we soon realized that we would be printing larger sets of documents and doing more frequent prints than previous implementers of the system. For these reasons, the number of items which could be printed with one command was increased to 50 in the new program.

Additional features made available included a specific message command and a command which would display the set history, or record of sets and what they contained, on the CRT.

F. Serendipitous Effects of Using the System

As already reported, the hands-on sessions were successful in locating relevant information for the nine visitors. The question or questions which

they brought to the session were answered. But two other features of the system were evident: Users were led to ask additional questions about the chosen area of investigation, and to pursue entirely different matters than those which originally concerned them.

This section of the report deals with the "intellectual fallout" or "horizon-widening" effect of the system. The section after this one deals with the advantages of the user interacting with the machine in planning search strategy, which--although a related aspect--is treated separately.

Seven of the nine evaluators reported that they asked additional and different questions about the subject which they originally were investigating, and seven--although not the same seven--said that they came upon material on different, though related, subjects which they would like to pursue at a later date.

Verbatims are presented here to demonstrate user reaction to this aspect of the system:

A I began to realize they had some articles of international scope . . . [and that] kind of opened up that area . . . .

C Well, as we began to look at the section on instructional television, there were some related topics there that I hadn't been aware of . . . . There were a couple of topics that interested me, one in the area of teacher training, which I just happened to run across, but I would like to look into at another time, although it wasn't particularly related to this study.

D The only thing I formulated was new areas to look under, for relevant research.

E Let me tell you some questions that were answered that I posed to myself, and were answered during the process . . . . New questions that are already answered . . . . I stumbled on something, again because there are some things that are

not in the thesaurus but are in DIALOG [identifiers]. I stumbled onto [specific] programing languages.

H . . . The biggest problem was staying with what I had originally pursued, instead of getting off on other interesting things.

I I did run across some other information [that I would want to pursue later] . . . . We've got our mind on one thing, particularly when we're researching something, one phase, and we only think to look in certain areas, and the thing that I liked about this, the machine points out that there may be some other related information . . . . This is, I think, very significant, and very helpful.

We assume that such "horizon-widening" effects are extremely desirable, and we can imagine no research administrator with such a narrow area of concern as to object to this aspect of DIALOG. To look at the situation from a different viewpoint, this aspect tends to bring the useful documents in the collection to the user's attention even though his preconceived ideas of what is available are incorrect.

This leads to the next section of the report, which evaluates being able to keep tabs on the search, and modify it, as it progresses.

G. Advantages of Interacting With the Ongoing Search

Six of the evaluators had favorable comments on the way the system made it possible to monitor and modify searches, but the other three should not be considered negative or indifferent. Most of the evaluators had no previous experience with computerized retrieval systems, and so could hardly compare DIALOG with non-interactive, batch-processing systems. Our feeling was that the evaluators reacted to DIALOG as an entity, and that

the overwhelmingly favorable general comments were to a great extent the result of this very basic aspect of the system.

The individual verbatims:

A It makes a big difference, because you get a feeling of control over your search that you don't have so much when you're actually in the library. There it's hard to remember exactly which things you were going to go back and do--you have to write things down, you have to organize things. Here you have handy little systems for putting something off somewhere and you just organize in your own mind the very basic concepts.

B It has a much more organizing effect, it helps to organize in a much more effective way.

C It helped me . . . . I think the fundamental help was I had some idea of the amount of information I was handling, or would be handling if I had it printed out. And it gave me some insight, too, into the amount of research that had gone on in certain areas.

D It's like having a great mass of information at your disposal, where you can somehow set up and know where you are and how much you've looked at.

F I think it made a great difference.

I It gives you other ideas and other, related, sources.

V. RESULTS OF THE 19 LATER EVALUATIONS

After the nine intensive case studies had been completed, the retrieval system was used to conduct searches requested by visitors to the clearinghouse. The observations and reactions of 19 of those visitors were recorded on six-page questionnaires which paralled, to a great extent, the "debriefing outline" used in the nine case studies. By the time the first of the 19 visitors arrived on the scene, the previously discussed modification of programing had been completed and it was DIALOG II rather than the original system which was observed.

There were no striking differences between the responses recorded on questionnaires by the 19 and the tape-recorded comments of the nine evaluators. One question on the questionnaire, however, had not been put to the nine evaluators:

> If DIALOG were readily available to you at a convenient location, how often would you like to use it?

All 18 visitors who answered the question indicated that they would like to use such a system several times a year or oftener. A third of the visitors indicated they would like to use it once a week or oftener. The number giving each answer is shown below:

never	once a year	several times a year	once a month	once a week	more often than once a week
0	0	6	6	4	2

About half the visitors (8 of 18) indicated the system revealed new aspects or dimensions of the subject to them, and about half (10 of 19) reported coming upon material on an entirely different subject which they then wished to pursue.

The 19 visitors were asked to volunteer what they considered good and bad features of the system. A total of 65 good features and 16 bad features were listed. No novel comments not included in the earlier remarks of the nine evaluators were made.

When prompted to evaluate specific features of the DIALOG system, the ratings were uniformly favorable. They are presented here in the spirit of making the record complete rather than with the idea of surprising any reader. Each scale is presented as a continuum, from the descriptive term presented at the left to that at the right. The number of visitors checking each point on the scale is indicated:

The Keyboard

easy to use	6	6	4	2	0	difficult to use

The Typed Terminal Record

easy to use	6	9	3	0	0	difficult to use
valuable in conducting a search	17	0	0	1	0	not valuable

The CRT or Visual Display

easy to use	10	6	0	1	0	difficult to use
valuable in conducting a search	18	0	0	0	0	not valuable

The Thesaurus

easy to use	8	2	3	0	0	difficult to use
valuable in conducting a search	7	4	2	0	0	not valuable

VI. REFLECTIONS ON HAVING THE SYSTEM AVAILABLE FOR SEVERAL MONTHS

Besides the nine case studies presented in this report, there are some observations on DIALOG which are a product of its use in the clearinghouse for a variety of tasks. These applications can be categorized as duplicate checking, in-house projects, answers to information requests, and visitor use. The actual experience which was gained from using DIALOG for these purposes has bearing on any future computerization of the ERIC files.

Duplicate checking is an extremely time-consuming process which, in the past, has involved manually checking each acquisitioned document against the current acquisition data log, and all past indexes. DIALOG has made it possible for the staff member in charge of this processing to do the checking more quickly and with greater assurance of not missing a document. The only requirement for this is that the file be as current as possible. A real improvement would be the ability to access the acquisition data log on the CRT, thereby streamlining the process still further.

A spin-off of the system is a "dump" of the indexes. This listing makes it possible to do routine checking at any time, saving on-line processing for the especially difficult documents. Again, for this to be continuously effective, it would be necessary to keep the listing updated. This listing also has value as a record of the number of relevant entries in the file on any given attribute, which makes it possible to check the size and scope of any search before actually getting on the system.

During the last two months of the contract period an updated file of 20,000 documents was being searched (the ERIC files through August of 1969).

Due to problems of disc space a title index was not available, which rendered the system nearly useless for duplicate checking. Some additional special programing or more disc space would solve this difficulty.

The in-house aspect of DIALOG use is similar to visitor use in that the system can be used to obtain extensive bibliographies on any subject being considered for a locally produced bibliography or state of the art paper, as well as to do literature searches to support other projects being undertaken by a clearinghouse. Three clearinghouses (in addition to ERIC at Stanford) have made use of this facility to produce long bibliographies for various projects. It has also been used to produce supporting bibliographies for clearinghouse-affiliated people working on a project of the Institute for Educational Development, evaluating the impact of Title VII research. Thus clearinghouse activities related to the analysis of information in the clearinghouse's specialty area are greatly assisted by the on-line searching capability.

The load of quite specific informational requests which flow into the clearinghouse (approximately 40 per month) can also be handled more effectively by using DIALOG. While it was in operation, the clearinghouse staff used DIALOG to handle 93 of these requests in depth. Without the on-line facility it would have been impossible to give each of these users an exhaustive bibliography. The requests instead would have been handled in a general way, perhaps by giving the person information on where he might start his search or who might be able to help him. DIALOG made it possible to give the requestor listings of things already processed by ERIC which conformed to his particular interests. Feedback from people receiving this service indicates that it was extremely useful and greatly appreciated.

An off-shoot of handling these requests was a compilation of the duplicates of past searches; these can be used to answer similar requests without using additional computer time.

Finally, and most importantly, DIALOG proved valuable to clearinghouse visitors. Through October 31, 46 people had had a demonstration and introduction to the system, 68 people had had their requests searched by a staff member while they were present to interact with the system, modifying the search strategy as necessary, and 21 people (including the nine evaluators) were taught to use the system and had hands-on experience. These people who used the clearinghouse as a source of ERIC materials were able to do their literature searches efficiently.

Perhaps most important here is the ease of use of the system. For people who are unfamiliar with computers and who have only a limited amount of time to devote to their professional research and to learning to use a new research technique, no matter how powerful it may be, it is quite important that the technique be simple to understand. Experience in demonstrating DIALOG and instructing people in its use indicates that it is simple and does not overwhelm the person unfamiliar with computers. The instruction did require staff time to teach people on an individual basis, but it is clear that the process could be made basically self-instructional through the development of some materials and a film or slide presentation. Then a minimal amount of staff time would be required to monitor the first use of the system, until the user was proficient.

To assist in explaining DIALOG, a set of 27 slides was prepared to demonstrate a fairly involved search for ethnic studies materials. A copy

of the script for the slide presentation is available free from the clearinghouse, and a set of the slides can be purchased from the Information Projects Research Fund (Attn. C. Collins, ERIC at Stanford) for $10.

Under the system employed, it took 20 to 30 minutes to familiarize the person with the equipment and procedures, after he had read the manual, and an additional half hour to an hour for him to become fairly adept at using the system. (Two of the evaluators reported a lack of confidence in their ability to use the system, even after two hours, but their results indicated they were effectively conducting searches.) Thus, with a small investment of time (no more than is ordinarily spent introducing visitors to the general ERIC system) a very powerful means of searching the file is made available.

Related to the question of instructing people in the use of DIALOG is the question of the manual. While it was useful, in general it probably was not adequately adapted for the educational user. Substantial revision could make it a more informative and instructive tool for the person unacquainted with computer systems.

It is interesting to note that the real difficulty in teaching people to use DIALOG had nothing to do with the system itself. Rather, it was the concept of coordinate searching that proved to be difficult. If the individual understood how coordinate indexing worked, it took only minutes to acquaint him with the few mechanical procedures which would allow him to search the file that way. However, the linear method of searching out materials is ingrained in most people, and time is required to help them understand coordinate searching.

No real pattern in search strategies emerged in the nine case studies. There are several reasons for this, one being that establishing a pattern requires extended use of the system. The other is that the nature of the search question rather than a personal pattern seems to determine the search strategy. In fact, as the interviews indicated, the display of thesaurus terms and of sets of documents retrieved by a strategy often opened up new approaches or dimensions to the initial question.

Also of interest is the fact that a person's satisfaction or dissatisfaction with his DIALOG experience related not so much to the procedures, but to whether the ERIC collection contained good sources of relevant information. Thus the concern was not with a difficult technique but with the quantity and quality of the literature being made available.

One matter of concern in the experience with DIALOG was its reliability. While this should not be overemphasized, there was a certain undependability. This came from a variety of sources and unfortunately was additive. There was some difficulty with hardware which, of course, was the responsibility of the supplier (in this case IBM). There was difficulty from time to time with the programing itself, which also caused delays and down-time. In the context of only six hours per week of on-line time, these delays and difficulties caused problems and frustrations for those using the system.

During the time that a second DIALOG terminal was operational at the U.S. Office of Education Regional Office in San Francisco, there were additional delays at Stanford caused by phone line problems with the San Francisco terminal. The equipment (CCI) used at San Francisco had the advantage of being less expensive that the equipment at the Stanford

clearinghouse. This decrease in expense was related to the type of phone connection; for the CCI equipment a standard audiograde phone line was used. Some of the delays were directly attributable to this lower quality connection between terminal and central processor.

As an estimate, once every two weeks (six sessions, or twelve hours) there was serious difficulty, at the Stanford clearinghouse, with the system. It is reasonable to assume, however, that increasing the size of the service blocks would not result in a proportionate increase in down-time. In a context which did not require tight scheduling and prior appointments, and where there was ample computer time available to do the things which needed to be done, this would seem less important.

An additional relevant fact is that over time the "bugs" in a program tend to be smoothed out, and so the system becomes more reliable with use. One reason we did not experience this kind of increasing dependability is that a considerable number of new and useful features were being added, and the actual program itself was changed once (see section IV-E of this report). The second program, DIALOG II, has additional sophistication and some procedural options which make it more powerful.

Only one further comment is in order: In any situation such as ERIC's project with DIALOG, cooperation between the people and groups involved is most important. The Information Sciences Laboratory Staff at Lockheed, and particularly Roger Summit and Don Schaaf, were extremely helpful. Their assistance and good will--and that of James Prevel, Acting Chief of the Bureau of Research's Equipment Development Branch--were most appreciated.

APPENDED MATERIALS

*Name*_____

QUESTIONNAIRE -- Part I (Pre-DIALOG Questions)

1. Please describe briefly the information you will be looking for in the ERIC file:

2. About how many documents do you expect to find in the ERIC file on this topic? (Please circle the correct answer)

   Less than 10 10-25 26-50 51-100 More than 100

3. Have you ever used the ERIC publication, RESEARCH IN EDUCATION? (Circle your answer)

   YES NO (If No, go to Question 5)

4. (If YES:) Have you searched RIE by subject? YES NO
   Have you searched RIE by title? YES NO
   Have you searched RIE by author? YES NO

5. Have you chosen any terms from the ERIC Thesaurus to begin your search?

   YES NO

   (If YES:) Please list the principal ones:

6. How familiar are you with on-line retrieval systems? (PLEASE CHECK EACH ANSWER THAT APPLIES)
   ( ) I've heard about them
   ( ) I've read about them
   ( ) I've studied them in some detail
   ( ) I've designed or cooperated in the design of an on-line system
   ( ) None of the above

7. How much experience with DIALOG have you had? (PLEASE CHECK EACH ANSWER THAT APPLIES)
   ( ) I have previously used DIALOG myself, sitting at the console
   ( ) I have watched another person use DIALOG
   ( ) I have had no previous experience with DIALOG

8. Have you read the DIALOG manual? YES NO

9. How much experience have you had with on-line retrieval systems other than DIALOG? (PLEASE CHECK THE ANSWER THAT BEST APPLIES)

( ) I have used several systems, each on more than one occasion
( ) I have used several systems, each on one occasion
( ) I have used one system on more than one occasion
( ) I have used one system on one occasion
( ) I have watched others using system(s)
( ) I have had no previous experience with on-line systems

DIALOG DEBRIEFING OUTLINE

(Questions calling for a prompt of additional information should be reprompted until the responder can't think of anything else.)

Before using the system, you said you would be searching the file for information on _____. I realize that you haven't had a chance to check the full texts of anything you retrieved, but do you think that you have located some relevant information?

Were your original questions answered to your satisfaction?

What are your general feelings or comments on the system?
(anything else?)

What would you pick out as its particularly good features?
(anything else?)

What are its bad or awkward features?
(something else?)

I have already asked you what questions you came in with. What, if any, new questions did you formulate during the search?
(any others?)

What led you to ask those questions?

How well did those questions get answered?

Did you run across any other material--perhaps entirely different subjects--which interest you and which you might want to search later?

Using the printed terminal record to help you remember specific things, I'd now like you to go back over the search explaining the strategy we used, the terms we employed, how they were combined, what results you were getting, and what strategy changes you made and why. Sort of a play-by-play.

Have you any other good comments on the system?
(something else?)

Have you further bad comments?
(anything else?)

Our interest is not only in evaluating this particular system--DIALOG--but in evaluating the interactive features of such systems. By this I mean the searching system itself rather than the quality of the material being searched. What difference did it make to you that you could "keep tabs on" or "monitor" the progress of the search?

(any other differences?)

How did this affect the search? (if not already clear)

How do you feel about:

the keyboard? Was it awkward, easy to get accustomed to?

the typed terminal record?

the CRT, visual display? What about this as compared to a single line or lines on a typewriter terminal as a means of monitoring the search?

the delays? Did they bother you?

the thesaurus?

the manual? Was it clear, useful?

Not limiting yourself to DIALOG, but to the whole ERIC system:

What good things could you see? (anything else?)

What bad things or things that need improvement? (anything else?)

What about the indexing?

Was it adequate?

Are the terms appropriate to the information?

Do you think that the range of information on your subject is covered as complelely as it should be, or is it only adequately covered or insufficiently covered?

Have you any suggestions as to the way this could be improved?

What about microfiche as a format for the storage of information?

Have you ordered things--fiche or hardcopy--from the ERIC Document Reproduction Service in the past?

How was the service?

How useful would it be to you to get hardcopy of selected documents in two weeks at 5¢ a page? (assuming that there is no problem with finances)

How useful is hardcopy delivery in half an hour if it is 10¢ a page?

Which would you prefer? (If not already obvious)

The 4 column headings indicate what command was given, what set number was assigned (if a set was created), how many documents are contained in that set, and finally a description of its contents.

SEARCH TITLE: ADULT BASIC EDUCATION PROGRAMS

DATE: 07/11/69

REQUESTOR: PERSON A

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)	
E-IT/BASIC ADULT ED				*The index around the descriptor, BASIC ADULT EDUCATION, was expanded (E). No entries were posted to this term.*
S-E9	1	59	IT/BASIC READING	*However, BASIC READING was there and was selected (S) to form set 1.*
E-E9				*BASIC READING was then expanded by its reference number, E9, in order to display its thesaurus entries. There was nothing of interest.*
E-IT/ADULT BASIC ED				
S-E5	2	126	IT/ADULT BASIC EDUCATION	*ADULT BASIC EDUCATION was expanded and then selected to form set 2.*
E-E5				*It was expanded again by the reference number to show the thesaurus entries.*
S-E12	3	57	IT/LITERACY EDUCATION	*The term LITERACY EDUCATION was found there and selected.*
E-IT/REMEDIAL PROGR				*Next, REMEDIAL PROGRAMS was expanded, and it and a number of alphabetically related terms were selected (sets 4 through 9).*
S-E3	4	63	IT/REMEDIAL INSTRUCTION	
S-E4	5	4	IT/REMEDIAL MATHEMATICS	
S-E5	6	61	IT/REMEDIAL PROGRAMS	
S-E6	7	58	IT/REMEDIAL READING	
S-E7	8	6	IT/REMEDIAL READING CLINICS	
S-E8	9	22	IT/REMEDIAL READING PROGRAMS	
E-E5				*REMEDIAL PROGRAMS was then expanded by reference number.*
S-E14	10	63	IT/COMPENSATORY EDUCATION	*Two more terms (sets 10 and 11) were located in its thesaurus entries.*
S-E17	11	94	IT/EDUCATIONALLY DISADVANTAGED	
E-E14				*COMPENSATORY EDUCATION was then expanded by its reference number (E 4) and one more relevant term was located in its thesaurus expansion (set 12).*
S-E18	12	145	IT/COMPENSATORY EDUCATION PROGRAMS	

E-IT/ADULT EDUCATIO				*The searcher now turned to the adult aspect or concept of his search. Expanding ADULT EDUCATION produced three relevant terms (sets 13, 14, 15).*
S-E2	13	8	IT/ADULT DEVELOPMENT	
S-E5	14	231	IT/ADULT EDUCATION	
S-E8	15	117	IT/ADULT EDUCATION PROGRAMS	
E-IT/ADULTS				*Expanding ADULTS produced four terms to be selected (sets 16 through 19).*
S-E4	16	184	IT/ADULT VOCATIONAL EDUCATION	
S-E6	17	1	IT/ADUT VOCATIONAL EDUCATION	
S-E1	18	40	IT/ADULT STUDENTS	
S-E5	19	87	IT/ADULTS	
E-IT/BASIC SKILLS				*And finally, BASIC SKILLS, which relates to the earlier concept, was expanded and selected.*
S-E5	20	50	IT/BASIC SKILLS	
C-3-12/+	21	504	3+4+5+6+7+8+9+10+11+12	*Set 21 was created by the union or addition of sets 3 through 12. This set then included most of the remedial or basic education terms.*
C-1+20+21	22	595	1+20+3+4+5+6+7+8+9+10+11+12	*Set 21 was then added to sets 1 and 20 to create the basic education concept group containing everything in the ERIC files indexed by one of these terms.*
C-13-15/+	23	352	13+14+15	*Set 23 was created by adding some of the adult terms together.*
C-23+18+19	24	456	18+19+13+14+15	*This process was completed by the addition performed in set 24, which now represents the adult concept in the search.*

Note that so far set 2 has been ignored, because it pre-coordinates the two concepts in the search and therefore should not be included in either concept set.

C-22*24	25	39	(1+20+3+4+5+6+7+8+9+10+11+12)*(18+19+13+14+15)	*Sets 22 (the basic or remedial education concept) and 24 (the adult education concept) were next combined (C) to form an intersection, the AND in Boolean logic, with the resulting set 25 containing 39 items indexed by at least one term from each concept set.*

D-25
K-25/1
K-25/2
K-25/3
K-25/4

This set was then displayed (D) and the first four retrieved items examined one by one on the CRT. The relevant ones, in this case all that were examined, were set aside using the keep (K) command into a reference set for future attention. This reference set is arbitrarily numbered 99.

S-IT/ILLITERATE ADU 26 33 IT/ILLITERATE ADULTS

In the examination of the first four items of set 25, a new term was turned up, ILLITERATE ADULTS, which had not been located earlier. This term was now selected directly (without going through the expansion).

C-26*22 27 21 (1+20+3+4+5+6+7+8+9+10+11+12)*26

The resulting set 26 was combined by an AND operation with set 22 (basic education terms) to form set 27.

C-25+27 28 57 ((1+20+3+4+5+6+7+8+9+10+11+12)*(18+19+13+14+15))+((1+20+3+4+5+6+7+8+9+10+11+12)*26)

The results of this combination and the previous one (set 25) were then added together to form set 28. Note that the number of items in 28 is not equal to the sum of the items in sets 25 and 27. This is so because a combination creates a set of unique documents where no item is repeated a second time.

D-28
K-28/2
K-28/7
K-28/8
K-28/10
K-28/12
K-28/13
K-28/14
K-28/16
K-28/18
K-28/19
K-28/20
K-28/21
K-28/23
K-28/25
K-28/26
K-28/27
K-28/28
K-28/29

Set 28 was then displayed item by item and the relevant ones set aside in the reference set.

K-28/30-57

After examining 30 references and keeping 22 of them, the evaluator determined to keep all of the remaining 17 and proceed further with the search.

C-2-28 29 109 2-(((1+20+3+4+5+6+7+8+9+10+11+12)*(18+19+13+14+15))+((1+20+3+4+5+6+7+8+9+10+11+12)*26))

Set 29 was created by subtracting the items already examined from set 2 the ADULT BASIC EDUCATION set. This avoids duplicate printing of any items.

A second aspect of the search was begun to turn up industrial and job training programs which dealt with basic skills.

E-IT/INDUSTRIAL TRA
S-E5 30 62 IT/INDUSTRIAL TRAINING
E-E5
S-E13 31 56 IT/INDUSTRIAL EDUCATION
S-E14 32 14 IT/INPLANT PROGRAMS
S-E15 33 113 IT/JOB TRAINING
S-E16 34 10 IT/OFF THE JOB TRAINING
S-E17 35 82 IT/ON THE JOB TRAINING
S-E19 36 240 IT/TRADE AND INDUSTRIAL EDUCATION

INDUSTRIAL TRAINING was expanded and selected and then expanded to its thesaurus entry. This produced six additional relevant terms.

C-30-36/+ 37 512 30+31+32+33+34+35+36

The seven industrial training terms were then combined by an OR operation to produce set 37.

C-37+16+17 38 591 16+17+30+31+32+33+34+35+36

Set 37 was then added to sets 16 and 17 which also relate to the same general concept.

C-38*22 39 18 (1+20+3+4+5+6+7+8+9+10+11+12)*(16+17+30+31+32+33+34+35+36)

This sum was intersected with the basic education concept group (set 22) to get set 39.

P-99/5 1-50 ITEMS HAVE BEEN PRINTED
P-29/5 1-109 ITEMS HAVE BEEN PRINTED
P-39/5 1-18 ITEMS HAVE BEEN PRINTED

Finally three prints (P) were initiated of sets 99, 29, and 39. Format 5 which contains the indexing, cataloging, and abstracts for each document was chosen. After the print had been completed off-line at Lockheed the results were sent to the clearinghouse for forwarding to the evaluator.

OK

SEARCH TITLE: INSTRUCTIONAL DESIGN

DATE: 06/27/69

REQUESTOR: PERSON B

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/INSTRUCTIONAL			
S-E1	1	1	IT/INSTRUCTION AIDS
S-E3	2	113	IT/INSTRUCTIONAL AIDS
S-E5	3	44	IT/INSTRUCTIONAL DESIGN
S-E7	4	141	IT/INSTRUCTIONAL IMPROVEMENT
S-E8	5	191	IT/INSTRUCTIONAL INNOVATION
E-E5			
S-E11	6	56	IT/EDUCATIONAL STRATEGIES
S-E14	7	128	IT/INSTRUCTIONAL TECHNOLOGY
S-E15	8	15	IT/MULTIMEDIA INSTRUCTION
S-E16	9	43	IT/RESEARCH DESIGN
E-IT/AUDIOVISUAL IN			
S-E5	10	127	IT/AUDIOVISUAL INSTRUCTION
S-E6	11	1	IT/AUDIOVISUAL INSTRUCTIONS
S-E7	12	1	IT/AUDIOVISUAL MATERIALS
S-E2	13	365	IT/AUDIOVISUAL AIDS
S-E9	14	34	IT/AUDIOVISUAL PROGRAMS
E-IT/EDUCATIONAL IN			
S-E3	15	134	IT/EDUCATIONAL IMPROVEMENT
S-E5	16	107	IT/EDUCATIONAL INNOVATION
S-E9	17	1	IT/EDUCATIONAL MATERIALS
E-IT/INSTRUCTIONAL			
S-E5	18	998	IT/INSTRUCTIONAL MATERIALS
S-E8	19	68	IT/INSTRUCTIONAL MEDIA
S-E6	20	46	IT/INSTRUCTIONAL MATERIALS CENTERS
C-3+4+5+6+15+16	21	611	3+4+5+6+15+16
C-1+2+7+8+9+10+11+1	22	693	1+2+7+8+9+10+11+12+13+14
C-22+17+18+19	23	1564	17+18+19+1+2+7+8+9+10+11+12+13+14
C-21*23	24	140	(3+4+5+6+15+16)*(17+18+19+1+2+7+8+9+10+11+12+13+14)
D-24			
K-24/2			
K-24/3			
K-24/4			
K-24			

```
E-IT/PROGRAMED INST
S-E5                    25    540    IT/PROGRAMED INSTRUCTION
S-E6                    26      1    IT/PROGRAMED MATERIAL
S-E7                    27    202    IT/PROGRAMED MATERIALS

E-IT/PROGRAMED INST
S-E8                    28     88    IT/PROGRAMED TEXTS
S-E9                    29      8    IT/PROGRAMED TUTORING

E-IT/COMPUTER ASSIS
S-E4                    30      1    IT/COMPUTED ASSISTED INSTRUCTION
S-E5                    31    105    IT/COMPUTER ASSISTED INSTRUCTION
S-E6                    32      8    IT/COMPUTER BASED LABORATORIES
S-E7                    33     68    IT/COMPUTER ORIENTED PROGRAMS

C-25-33/+               34    761    25+26+27+28+29+30+31+32+33

C-21*34                 35     72    (3+4+5+6+15+16)*(25+26+27+28+29+30+31+32+33)

D-35

D-35

C-35-24                 36     41    POLISH STRING OVERFLOWS 2 LINES. NO ERROR.

D-36
K-36/2
K-36/3
K-36/4
K-36/5
K-36/9
K-36/10
K-36/13
K-36/14
K-36/16
K-36/17
K-36/18
K-36/19
K-36/21
K-36/23
K-36/24
K-36/25
K-36/28
K-36/30
K-36/31
K-36/32
K-36/33
K-36/34
K-36/36
K-36/37
K-36/38
K-36/39
K-36/40
K-36/41
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```
D-99/1

C-99*36                 37    28    POLISH STRING OVERFLOWS 2 LINES. NO ERROR.

E-IT/FILMS
S-E5                    38   187    IT/FILMS
E-E5
S-E12                   39     1    IT/MOTION PICTURES
S-E14                   40   183    IT/INSTRUCTIONAL FILMS
S-E16                   41     6    IT/SINGLE CONCEPT FILMS
S-E17                   42    30    IT/SOUND FILMS
S-E27                   43     5    IT/REPETITIVE FILM SHOWINGS

C-38-43                 44   185    38-43

C-38-43/+               45   339    38+39+40+41+42+43

C-21*45                 46    27    (3+4+5+6+15+16)*(38+39+40+41+42+43)

D-46
K-46/1
K-46/2
K-46/3
K-46/5
K-46/6
K-46/7
K-46/8
K-46/10
K-46/11
K-46

P-99/5                        1-181  ITEMS HAVE BEEN PRINTED.
```

SEARCH TITLE: MULTIMEDIA TELEVISION

DATE: 06/04/69

REQUESTOR: PERSON C

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/MULTIMEDIA			
S-E6	1	15	IT/MULTIMEDIA INSTRUCTION
E-E6			
S-E12	2	44	IT/INSTRUCTIONAL DESIGN
S-E13	3	191	IT/INSTRUCTIONAL INNOVATION
S-E14	4	998	IT/INSTRUCTIONAL MATERIALS
S-E15	5	128	IT/INSTRUCTIONAL TECHNOLOGY
D-1			
K-1/2			
K-1/3			
K-1/4			
K-1/6			
K-1/7			
K-1/10			
K-1/14			
E-IT/TELEVISION			
S-E4	6	155	IT/TELEVISED INSTRUCTION
S-E5	7	88	IT/TELEVISION
S-E7	8	22	IT/TELEVISION CURRICULUM
S-E8	9	2	IT/TELEVISION INSTRUCTION
D-9			
E-IT/INSTRUCTIONAL			
S-E5	10	153	IT/INSTRUCTIONAL TELEVISION
E-E5			
S-E16	11	113	IT/INSTRUCTIONAL AIDS
E-IT/EDUCATIONAL TE			
S-E5	12	238	IT/EDUCATIONAL TELEVISION
E-E5			
S-E18	13	91	IT/CLOSED CIRCUIT TELEVISION
S-E23	14	26	IT/OPEN CIRCUIT TELEVISION
S-E24	15	13	IT/TELECOURSES
C-6-15/+	16	572	6+7+8+9+10+11+12+13+14+15
C-16-11	17	459	(6+7+8+9+10+11+12+13+14+15)-11
C-11+4	18	1083	4+11
S-IT/EDUCATIONAL IN	19	107	IT/EDUCATIONAL INNOVATION

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C-19+3+5                20      403     3+5+19

C-17*18*20              21        9     ((6+7+8+9+10+11+12+13+14+15)-11)*(4+11)*(3+5+19)

D-21
K-21/1
K-21/2
K-21/4
K-21/6
K-21/7
K-21/8
K-21/9

E-IT/SIMULATION GAM
S-E4                    22      103     IT/SIMULATION
E-E4
S-E10                   23        7     IT/TECHNIQUES
S-E12                   24        8     IT/GAME THEORY
E-IT/GAMES
S-E5                    25       25     IT/GAMES
E-E5
S-E11                   26       10     IT/EDUCATIONAL GAMES

D-23
D-24
K-24/5
K-24/8

D-25
K-25/2
K-25/7
K-25/10

D-26
K-26/1
K-26/4
K-26/5
K-26/6

E-IT/FILM LOOPS
E-IT/FILMSTRIP
E-IT/ROLE PLAYING
S-E5                    27       36     IT/ROLE PLAYING
D-27
K-27/14

P-99/5                          1-24    ITEMS HAVE BEEN PRINTED.

GOOD WORK THANK YOU
```

SEARCH TITLE: ASSESSMENT OF PERCEIVED ENVIRONMENT

DATE: 06/25/69

REQUESTOR: PERSON D

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/COLLEGE AND UN			
S-E4	1	1	IT/COLLEGE AND UNIVERSITY ENVIRONMENT SCALE
S-E5	2	4	IT/COLLEGE AND UNIVERSITY ENVIRONMENT SCALES
S-E6	3	1	IT/COLLEGE AND UNIVERSITY ENVIRONMENT SCALES %CUES<
S-E7	4	1	IT/COLLEGE AND UNIVERSITY ENVIRONMENTAL SCALES
C-1+2+3+4	5	7	1+2+3+4
D-5			
K-5/1			
K-5/2			
K-5/3			
K-5/4			
K-5/5			
K-5/6			
K-5/7			
E-IT/COLLEGE CHARAC			
S-E4	6	1	IT/COLLEGE CHARACTERISTICS ANALYSIS %CCA<
S-E5	7	2	IT/COLLEGE CHARACTERISTICS INDEX
S-E6	8	2	IT/COLLEGE CHARACTERISTICS INDEX %CCI<
C-6+7+8	9	4	6+7+8
D-9			
K-9/1			
K-9/2			
K-9/3			
K-9/4			
E-IT/ACTIVITIES IND			
S-E5	10	3	IT/ACTIVITIES INDEX
S-E6	11	1	IT/ACTIVITIES INDEX %AI<
C-10+11	12	4	10+11
D-12			
E-IT/ORGANIZATIONAL			
S-E3	13	1	IT/ORGANIZATIONAL BEHAVIOR DESCRIBER SURVEY
S-E6	14	2	IT/ORGANIZATIONAL CLIMATE DESCRIPTION QUESTIONNAIRE
S-E7	15	1	IT/ORGANIZATIONAL CLIMATE DESCRIPTIVE QUESTIONNAIRE
S-E8	16	2	IT/ORGANIZATIONAL CLIMATE INDEX

C-13-16/+	17	6	13+14+15+16
D-17			
K-17/1			
K-17/2			
K-17/3			
K-17/4			
K-17/5			
K-17/6			
E-IT/HIGH SCHOOL CH			
S-E5	18	1	IT/HIGH SCHOOL CHARACTERISTICS INDEX
D-18			
K-18/1			
E-IT/CLASSROOM CLIM			
S-E6	19	4	IT/CLASSROOM CLIMATE QUESTIONNAIRE
S-E9	20	103	IT/CLASSROOM ENVIRONMENT
D-19			
K-19/1			
K-19/2			
K-19/3			
K-19/4			
E-IT/ELEMENTARY SCH			
E-I /HIGH SCHOOL AT			
E-IT/COLLEGE ATMOSP			
E-IT/ENVIRONMENT			
S-E5	21	24	IT/ENVIRONMENT
S-E6	22	1	IT/ENVIRONMENTAL ASSESSMENT TECHNIQUE
E-E5			
S-E15	23	63	IT/EDUCATIONAL ENVIRONMENT
S-E17	24	35	IT/INSTITUTIONAL ENVIRONMENT
S-E29	25	136	IT/ENVIRONMENTAL INFLUENCES
S-E32	26	38	IT/ORGANIZATIONAL CLIMATE
E-IT/CLIMATE			
D-22			
K-22/1			
E-IT/PERCEIVED ENVI			
S-E6	27	111	IT/PERCEPTION
S-E7	28	36	IT/PERCEPTION TESTS

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E-IT/MEASUREMENT TE
S-E2                    29      1    IT/MEASUREMENT INSTRUMENT INSTRUMENTS
S-E3                    30    167    IT/MEASUREMENT INSTRUMENTS
S-E5                    31    128    IT/MEASUREMENT TECHNIQUES
S-E6                    32      1    IT/MEASURING INSTRUMENTS
E-E5
S-E12                   33     34    IT/INSTRUMENTATION
S-E22                   34     54    IT/MEASUREMENT
S-E25                   35    208    IT/TESTING
E-E25
S-E11                   36      1    IT/TESTING METHODS
S-E33                   37     46    IT/PREDICTIVE VALIDITY
S-E39                   38    151    IT/TEST CONSTRUCTION
S-E43                   39    178    IT/TESTS

C-20+21+23+24+25+26     40    366    20+21+23+24+25+26

C-27-30/+               41    307    27+28+29+30

C-31-39/+               42    685    31+32+33+34+35+36+37+38+39

C-41+42                 43    913    27+28+29+30+31+32+33+34+35+36+37+38+39

C-40*43                 44     36    (20+21+23+24+25+26)*(27+28+29+30+31+32+33+34+35+36+37+38+39)

D-44
K-44/2
K-44/3
K-44/8
K-44/9
K-44/10
K-44/14
K-44/20
K-44/22
K-44/26
K-44/28
K-44/30
K-44/31
K-44/33

E-IT/COPING ANALYSI
E-IT/CUES
S-E5                    45      1    IT/CUES
D-45
E-IT/CCI
S-E6                    46      1    IT/CCQ
D-46
E-IT/OCDQ
E-IT/HSCI
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E-IT/ECOLOGY			
S-E4	47	14	IT/ECOLOGICAL FACTORS
S-E5	48	30	IT/ECOLOGY
C-47+48	49	43	47+48
D-49			
K-49/1			
K-49/4			
K-49/9			
K-49/10			
K-49/12			
K-49/21			
K-49/22			
K-49/36			
K-49/37			
P-99/5		1-45	ITEMS HAVE BEEN PRINTED

SEARCH TITLE: COMPUTERS

DATE: 05/27/69

REQUESTOR: PERSON E

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/COMPUTERS			
S-E3	1	1	IT/COMPUTER SCIENCE EDUCATION
S-E2	2	4	IT/COMPUTER SCIENCE
S-E5	3	130	IT/COMPUTERS
D-1			
D-2			
E-IT/COMPUTERS			
E-E5			
E-E20			
E-E17			
E-E17			
E-E17			
E-E15			
S-E13	4	54	IT/LINGUISTIC THEORY
E-IT/TRANSFORMATION			
S-E3	5	45	IT/TRANSFORMATION GENERATIVE GRAMMAR
C-4*5	6	5	4*5
D-6			
D-6			
K-6/1			
K-6			
E-AU/DYEN			
S-E6	7	6	AU/DYEN, ISIDORE
D-7			
K-7/5			
K-7/6			
E-AU/HAJDU, PETER			
S-E5	8	1	AU/HAJDU, PETER
D-8			
K-8			
S-AU/CHOMSKY, NOAM	9	2	AU/CHOMSKY, NOAM
D-9			
K-9			

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E-IT/THESAURI
S-E6                10      1    IT/THESAURUS OF ENGINEERING AND SCIENTIFIC TERMS
D-10
E-IT/ENGINEERING
S-E5                11     50    IT/ENGINEERING
S-IT/THESAURI       12     23    IT/THESAURI

C-11*12             13      1    11*12

D-13
E-IT/EURATOM
E-IT/ALGOL
S-E5                14      1    TI/ALGOL
D-14
E-IT/SNOBOL
S-E5                15      2    IT/SNOBOL
D-15
K-15/1
D-15/2/2
K-15/2

E-IT/COMPUTER ASSIS
S-E4                16      1    IT/COMPUTED ASSISTED INSTRUCTION
S-E5                17    105    IT/COMPUTER ASSISTED INSTRUCTION
S-E7                18     68    IT/COMPUTER ORIENTED PROGRAMS
E-IT/INFORMATION PR
S-E5                19    104    IT/INFORMATION PROCESSING
S-E6                20    119    IT/INFORMATION RETRIEVAL
S-E7                21     17    IT/INFORMATION SCIENCE
E-IT/CYBERNETICS
S-E5                22     23    IT/CYBERNETICS
E-IT/PROGRAMMING LA

C-16-22/+           23    357    16+17+18+19+20+21+22

C-1-10/+            24    233    1+2+3+4+5+(4*5)+7+8+9+10

C-11-22/+           25    404    11+12+(11*12)+14+15+16+17+18+19+20+21+22

C-24-25/+           26    572    1+2+3+4+5+(4*5)+7+8+9+10+11+12+(11*12)+14+15+16+17+18+
                                                                  19+20+21+22

S-IT/COMPUTATIONAL  27     37    IT/COMPUTATIONAL LINGUISTICS
K-27
E-IT/LINGUISTICS
S-E5                28    243    IT/LINGUISTICS
E-IT/LANGUAGES
S-E5                29    122    IT/LANGUAGES
E-IT/STATISTICS
S-E5                30     13    IT/STATISTICS
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C-28+29              31    348    28+29

C-30*31                      0

S-E2                 32    379    IT/STATISTICAL DATA
E-E2
E-E2
S-E11                33     35    IT/COMPARATIVE STATISTICS
S-E25                34    256    IT/STATISTICAL ANALYSIS

C-32-34/+            35    644    32+33+34

C-35*31              36     11    (28+29)*(32+33+34)

D-36

P-99/2

P-23/2                      1-357  ITEMS HAVE BEEN PRINTED.

P-23/4                      1-357  ITEMS HAVE BEEN PRINTED.
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SEARCH TITLE: MICROFICHE READER/PRINTERS

DATE: 06/13/69

REQUESTOR: PERSON F

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/MICROFICHE			
E-E5			
E-E6			
S-E10	1	7	IT/MICROFICHE
D-1			
K-1/3			
D-1/2/2			
D-1/2/4-7			
K-1			
E-IT/TECHNOLOGY			
S-E4	2	11	IT/TECHNOLOGICAL DEVELOPMENT PROJECT
D-2			
E-IT/DATA CONTROL			
E-IT/MICROPHOTOGRAP			
E-E3			
S-E3	3	7	IT/MICROFILM
D-3			
E-AU/HOLMES			
E-AU/COOMBS			
E-TI/GUIDE			
E-TI/GUIDE L			
E-TI/GUIDE P			
E-PS/EDUCATIONAL FA			
S-E6	4	20	PS/EDUCATIONAL FACILITIES LABS. INC., NEW YORK, N.Y.
D-4			
C-3*4	5	1	3*4
D-5			
E-PS/FORD FOUNDATIO			
S-E6	6	6	PS/FORD FOUNDATION, NEW YORK, N.Y.
D-6			

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E-IT/FACSIMILE
S-E7                7       2    IT/FACSIMILE TRANSMISSION
D-7
E-IT/TELECOMMUNICAT
S-E8                8       1    IT/TELEPHONE COMMUNICATIONS INDUSTRY
D-8

E-AU/PIERCE
S-E9                9       1    AU/PIERCE, J.L.
D-9
E-AU/PIERCE, J.R.

E-PS/BELL TELEPHONE
S-E6               10       1    PS/BELL TELEPHONE LABS., INC. MURRAY HILL, N.J.
D-10

E-IT/SATELLITE
E-IT/COMSAT
S-E5               11       3    IT/COMSAT

D-11
D-11/5/1-3

E-PS/HARVARD UNIVER
S-E4               12       3    PS/HARVARD UNIV., CAMBRIDGE, MASS.,LAB. RES.INS
D-12
E-IT/ARIZONA
S-IT/HARVARD UNIVER13       4    IT/HARVARD UNIVERSITY
S-IT/COLUMBIA UNIVE14       5    IT/COLUMBIA UNIVERSITY
S-IT/UNIVERSITY OF 15       4    IT/UNIVERSITY OF CHICAGO
C-13*14*15                  0

E-IT/LIBRARY AUTOMA
S-E2               16      10    IT/LIBRARY ACQUISITION
S-E3               17       1    IT/LIBRARY ACQUISTION
D-16
D-17
K-17/1

E-AU/RUECKING
E-AU/DILLON, H.W.
E-AU/OVERHAGE, C.F.

E-PS/INTREX
E-PS/MIT PROJECT IN
E-PS/PROJECT INTREX
E-PS/MASSACHUSETTS
S-E4               18      12    PS/MASSACHUSETTS INST. OF TECH., CAMBRIDGE
D-18
E-PS/ELECTRONIC SYS
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E-AU/STEVENS
E-AU/BENENFIELD, AL
E-AU/SIMONTON

E-IT/CRT
E-IT/VISUAL DISPLAY
E-IT/CATHODE RAY TU
E-IT/TERMINAL

SEARCH TITLE: SOFT COPY

DATE: 06/13/69

REQUESTOR: PERSON F - 2

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/SOFTPCOPY			
E-IT/PHOTODUPLICATI			
E-PS/IBM			
E-PS/INTERNATIONAL			
S-E4	1	1	PS/INTERNATIONAL BUSINESS MACHINE CORP.
S-E6	2	8	PS/INTERNATIONAL BUSINESS MACHINES CORP.
S-E7	3	1	PS/INTERNATIONAL BUSINESS MACHINES CORP., OWEGO, N
C-1-3/+	4	10	1+2+3
S-IT/LIBRARIES	5	82	IT/LIBRARIES
C-4-5/+	6	92	1+2+3+5
C-4-5/*		0	
E-AU/RABINOW			
S-E6	7	1	AU/RABINOW, BARNEY
D-7			
E-IT/OPTICAL CHARAC			
S-E6	8	1	IT/OPTICAL CHARACTER RECOGNITION %OCR<
S-E7	9	1	IT/OPTICAL SCANNERS

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C-8-9/*                 10      1     8*9

D-10
E-PS/CONTROL DATA C
S-E2                    11      1     PS/CONSORTIUM OF UNIVERSITIES OF METRO.WASHINGTON
D-11
E-IT/LIBRARY TECHNI
E-IT/TELETYPEWRITER
S-E4                    12      2     IT/TELETYPEWRITER
S-E3                    13      1     IT/TELETYPE

C-12-13/+               14      3     12+13

D-14
E-IT/ULTRAFICHE
S-E6                    15     20     IT/UNCOMMONLY TAUGHT LANGUAGES
D-15
E-AU/GREENBERG
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SEARCH TITLE: LITERATURE ON LECTURING

DATE: 06/11/69

REQUESTOR: PERSON G

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
S-IT/LECTURE	1	35	IT/LECTURE
D-1			
K-1/3			
K-1/4			
K-1/5			
K-1/6			
K-1/11			
K-1/12			
K-1/15			
K-1/16			
K-1/17			
K-1/18			
K-1/23			
K-1/29			
K-1/30			
K-1/31			
K-1/34			
K-1/35			
E-IT/PRESENTATION			
E-IT/LECTURE			
E-E5			
S-E11	2	432	IT/TEACHING TECHNIQUES
S-E14	3	96	IT/SPEECHES
E-E11			
S-E16	4	1	IT/LEAD LECTURE PLAN
S-E11	5	61	IT/CLASSROOM TECHNIQUES
S-E18	6	9	IT/MASS INSTRUCTION
S-E22	7	45	IT/SMALL GROUP INSTRUCTION
S-E20	8	99	IT/REINFORCEMENT
C-5*8		0	
C-2*8	9	7	2*8

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D-9
K-9/2
K-9/3
K-9/4
D-9/4/6
K-9/6
D-6
K-6/5
D-4
K-4/1

C-3*8                10      2     3*8

D-10
K-10/2

C-7*8                11      1     7*8

D-11
K-11/1

E-IT/TEACHING TECHN
S-E2                 12      2     IT/TEACHING SITUATION REACTION TEST
K-12
S-E3                 13      15    IT/TEACHING SKILLS
K-13
S-E4                 14      17    IT/TEACHING STYLES
K-14

C-8*13               15      1     8*13

C-8*14               16      1     8*14

D-15
D-16
S-IT/TEACHING METHO17        563   IT/TEACHING METHODS

C-17*8               18      6     8*17

D-18
K-18/5
 -IT/MOTIVATIONAL T
S-IT/MOTIVATION TEC19        47    IT/MOTIVATION TECHNIQUES

C-19*2               20      5     2*19

D-20
K-20/3
K-20/4

P-99/5                       1-59  ITEMS HAVE BEEN PRINTED.
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SEARCH TITLE: PROGRAMED INSTRUCTION IN READING

DATE: 07/23/69

REQUESTOR: PERSON H - 1

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/PROGRAMED INST			
S-E5	1	540	IT/PROGRAMED INSTRUCTION
S-E7	2	202	IT/PROGRAMED MATERIALS
S-E9	3	8	IT/PROGRAMED TUTORING
E-E5			
S-E23	4	15	IT/MULTIMEDIA INSTRUCTION
S-E31	5	48	IT/RESPONSE MODE
C-1+2+3+4+5	6	651	1+2+3+4+5
E-IT/READING			
S-E5	7	148	IT/READING
S-E6	8	53	IT/READING ABILITY
S-E7	9	174	IT/READING ACHIEVEMENT
S-E8	10	1	IT/READING AND STUDY SKILLS LABORATORY
E-E5			
S-E12	11	102	IT/BEGINNING READING
S-E16	12	24	IT/DEVELOPMENTAL READING
S-E22	13	1	IT/GROUP READING
S-E23	14	26	IT/INDEPENDENT READING
S-E24	15	8	IT/INDIVIDUAL READING
S-E25	16	13	IT/INDIVIDUALIZED READING
S-E32	17	58	IT/REMEDIAL READING
S-E36	18	172	IT/LANGUAGE ARTS
S-E41	19	34	IT/INITIAL TEACHING ALPHABET
S-E53	20	59	IT/READING DIFFICULTY
S-E54	21	13	IT/READING FAILURE
S-E63	22	63	IT/READING READINESS
S-E69	23	27	IT/RETARDED READERS
E-E25			
S-E11	24	1	IT/INDIVIDUALIZED INSTRUCTION
S-E14	25	147	IT/READING PROGRAMS
S-E15	26	563	IT/TEACHING METHODS

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C-6+24+26              27   1167    1+2+3+4+5+24+26

C-7-17/+               28    508    7+8+9+10+11+12+13+14+15+16+17

C-18-23/+              29    340    18+19+20+21+22+23

C-25+28+29             30    776    25+7+8+9+10+11+12+13+14+15+16+17+18+19+20+21+22+23

C-27*30                31    105    (1+2+3+4+5+24+26)*(25+7+8+9+10+11+12+13+14+15+16+17+
                                                        18+19+20+21+22+23)

D-31

P-31/5                       1-105  ITEMS HAVE BEEN PRINTED.

VERY INTERESTING.
```

SEARCH TITLE: 8MM SINGLE CONCEPT FILMS INDIVIDUALIZED INSTRUCTION

DATE: 07/22/69

REQUESTOR: PERSON I - 1

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/SINGLE CONCEPT			
S-E5	1	6	IT/SINGLE CONCEPT FILMS
E-E5			
S-E11	2	365	IT/AUDIOVISUAL AIDS
S-E14	3	183	IT/INSTRUCTIONAL FILMS
S-E10	4	187	IT/FILMS
E-E10			
S-E12	5	1	IT/MOTION PICTURES
S-E22	6	28	IT/FILM PRODUCTION
S-E27	7	5	IT/REPETITIVE FILM SHOWINGS
C-1-7/+	8	616	1+2+3+4+5+6+7
E-IT/INDIVIDUALIZED			
S-E5	9	1	IT/INDIVIDUALIZED INSTRUCTION
S-E4	10	22	IT/INDIVIDUALIZED CURRICULUM
S-E6	11	61	IT/INDIVIDUALIZED PROGRAMS
S-E9	12	2	IT/INDIVIDUALLY PRESCRIBED INSTRUCTION %IPI<
E-E4			
S-E12	13	229	IT/INDIVIDUAL INSTRUCTION
E-E13			
C-9-13/+	14	291	9+10+11+12+13
C-8*14	15	75	(1+2+3+4+5+6+7)*(9+10+11+12+13)
K-15/1			
K-15/4			
K-15/6			
K-15/7			
K/15/12			
K-15/13			
S-IT/DIESEL ENGINES	16	57	IT/DIESEL ENGINES
C-15-16	17	21	((1+2+3+4+5+6+7)*(9+10+11+12+13))-16

D-16
D-16/2/55-57
D-1
K-1/1
K-1/2
K-1/3
K-1/4
K-1/5
K-1/6
D-12
K-12/1
K-12/2

E-IT/8MM

P-99/5 1-14 ITEMS HAVE BEEN PRINTED.

VERY GOOD. I FOUND THIS SERVICE VERY INTERESTING, INFORMATIVE, AND HELPFUL

SEARCH TITLE: MULTI-MEDIA INSTRUCTION

DATE: 07/22/69

REQUESTOR: PERSON I - 2

COMMAND-OPERAND(S)	SET NO.	NO.IN SET	DESCRIPTION OF SET (+=OR,*=AND,-=NOT)
E-IT/MULTI-MEDIA IN			
E-IT/MULTIMEDIA INS			
S-E5	1	15	IT/MULTIMEDIA INSTRUCTION
E-E5			
S-E13	2	191	IT/INSTRUCTIONAL INNOVATION
S-E15	3	128	IT/INSTRUCTIONAL TECHNOLOGY
E-E13			
S-E11	4	107	IT/EDUCATIONAL INNOVATION
E-IT/READING			
E-IT/READING			
S-E8	5	1	IT/READING AND STUDY SKILLS LABORATORY
S-E5	6	148	IT/READING
E-E5			
S-E11	7	59	IT/BASIC READING
S-E14	8	22	IT/CONTENT READING
S-E15	9	10	IT/CREATIVE READING
S-E16	10	24	IT/DEVELOPMENTAL READING
S-E22	11	1	IT/GROUP READING
S-E25	12	13	IT/INDIVIDUALIZED READING
C-2-4/+	13	403	2+3+4
C-5-12/+	14	26	5+6+7+8+9+10+11+12
C-5+6+7+8+9+10+11+1	15	264	5+6+7+8+9+10+11+12
C-5-12/+	16	264	5+6+7+8+9+10+11+12
C-13*14	17	9	(2+3+4)*(5+6+7+8+9+10+11+12)
D-17			
K-17/1			
K-17/3			
K-17/4			
K-17/5			
K-17/6			
K-17/7			
K-17/8			
K-17/9			

D-1
K-1/1
K-1/5
K-1/6
K-1/8
K-1/9
K-1/11
K-1/12
K-1/14
K-1/15

P-99/5 1-17 ITEMS HAVE BEEN PRINTED.

VERY GOOD. THANK YOU FOR YOUR ASSISTANCE.